Skyways

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t's Report:
o Reader & A-12

PRODUCING and DELIVERING!

Eight AERO COMMANDERS are rolling from the production lines of the factory of the Aero Design and Engineering Company each month. First airplane of its category to be built and delivered to a civilian market since World War II, 32 of these new high-performance executive transports already have gone to work in the service of some of the leading business firms of the country.

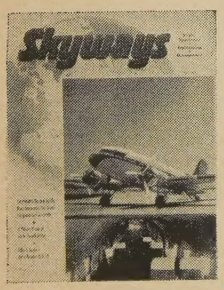
AERO DESIGN Commander

TULAKES AIRPORT • OKLAHOMA CITY, OKLAHOMA

Skyways

JANUARY 1953

Flight Operations • Engineering • Management



COVER: Executive DC-3 is owned, operated by Sawhill Mfg. Co. of Sharon, Pa. Pilot is Ralph Matthews, Jr. Copilot is F. Rennick.

VOLUME 12, NUMBER 1

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air your views . . .

Still More Stall Talk

Gentlemen:

In regard to the article entitled "Stall Talk" in the November "Air Your Views," I believe Mr. R. L. Kruse could not be any more all wet if he fell into the middle of the ocean. His article offers more figures than a Miss America contest, and fewer facts than a campaign speech.

Here are some real facts:

1. The only thing that keeps an airplane in the air is "lift." If you have enough, you fly; if you don't, you stall.

2. Only two things determine the amount of lift present. They are "thrust" and "angle of attack" (flaps and other artificial devices designed to affect lift excepted).

Thrust may be created in several ways, *e.g.* a powerplant, gravity, and external tow, or by reaction to an external force (wind) when applied to an anchored object (airplane). An airplane sitting on a runway facing into the wind receives an induced thrust that is equal to the force of the wind only because the friction of the tires and brakes hold it from being blown backward by the wind.

The effect of thrust is shown by the airspeed; the effect of lift is shown by the rate of climb indicator.

In flight, if the thrust is constant and the angle of attack is constant, then the lift will be constant. No change in either wind velocity or direction will have the slightest effect on any of those factors. The discrepancy comes from the inability of the pilot to maintain a constant angle of attack. Here is concrete proof:

A carrier aircraft accelerates across the deck to a deck speed of, let's say 30 knots, but due to the induced thrust from the carrier and the wind, his airspeed is 70 knots and he starts to fly. The instant his wheels leave the deck he loses the effect of about a 30-knot headwind. Obviously, he does not stall. Hypothetically, let's say that at the angle the plane is sitting on the deck and at the power setting of 35 in. hg., 2500 rpm, the airplane will, while in flight, maintain an IAS of 70 knots (slightly above stalling) and will climb at 100 fpm. Put in a gyropilot that could hold that angle constant, set the controls for the above-mentioned power setting, and turn the airplane loose on the deck of a carrier going 30 knots into a 20-knot wind. The airplane will move across the deck until it has attained a deck speed of 20 knots, at which time it will begin to climb at 100 fpm and 70 knots IAS, and will continue to do so until the density of the air changes enough to affect the situation. No air currents from any direction will have any effect, whatsoever.

Obviously, from the above, Mr. Al Knouff also is all wet. As Tennyson once said, "All that we have the power to see is a straight staff, bent in a pool." Like the flying saucers, Mr. Knouff saw something. But what? Probably this:

The airplane is on approach, with a 10-knot wind gusting to 25 knots. The pilot has set up his glide, the nose is pointed right at the end of the runway, airspeed—5 knots above stalling. Suddenly, the wind increases from 10 knots to 25 knots. This should make the pilot undershoot, but this pilot doesn't plan to undershoot. He just keeps the nose right on the same spot. Unconsciously, he is raising the nose to do so. This has a very nasty effect on airspeed.

Seriously, could one possibly walk away from that wreckage without the old phrase ringing in his ears, "Never stretch a glide!" And will pilots never quit looking for excuses for boners, and remember that other old phrase, "This airplane was built to fly . . . and if you don't mess it, it will!"

LT. R. MCGAUNN
1909th AACS Sq.
Andrews AFB
Washington, D. C.

There seems to be no end to this argument, and explanations from both sides offer up a lot of truths. Your editor feels as though he'd been watching a tennis match, and at this point declines, thank you, the job of being an umpire. In the interest of a decision, we're going to call in an "authority." We'll post his verdict (and his qualifications for being given the job as decider) as soon as we get it.—Ed.

Corporate Service

Gentlemen:

It is my belief that you of SKYWAYS are performing a very useful and helpful service to corporation aircraft operations in the conception and conducting of the round-table meetings. The reportorial and editorial policies indicated in your recent issues are to me important to a very vital segment of the aircraft industry.

H. P. HENNING
Check Pilot
Air Transport Div.
General Motors Corp.
Detroit, Mich.

Gentlemen:

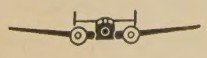
I have read your revised magazine and talked with many of your readers. The unanimous reaction is that your new concept is very favorable.

A. L. UELTSCHI
President
Flight Safety, Inc.
LaGuardia Field, N. Y.

We deeply appreciate such words of confidence and are grateful that our efforts meet with your approval.—Ed.

in this issue...

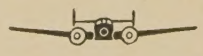
Capt. Thomas J. Wiley, Jr. calls himself "an involuntary recallee" in the Air Force, having been recalled to active duty with the Virginia Air National Guard in 1951. Tommy actually joined the Air Force as an aviation cadet in 1941, and graduated in 1943 from the West Coast Training Command. He was then sent to India where he flew for 22 months with the CBI Wing of the Air Transport Command. Following that tour of duty, Tommy joined the Trans-Pacific Wing of ATC and flew C-54's across the Pacific from Fairfield-Suisun AFB, California. In civilian life, Capt. Wiley was assistant sports editor and aviation editor of the Richmond News Leader in Richmond, Va. He went back to newspaper work in 1946 after World War II, but couldn't stay away from flying, so joined the Virginia Air National Guard as a member of the Utility Flight and flew C-47's, B-26's, AT-6's and F-47's until he was called to active duty and sent to Turner AFB at Albany, Ga. in 1951. It was at Turner that Capt. Wiley met Col. Dave Schilling when he assumed command of the 31st Fighter-Escort Wing. Deeply impressed with Col. Schilling's leadership and flying ability, Capt. Wiley says, "Schilling is the most colorful pilot I've ever met and I was happy when he was tapped for the first Trans-Pacific jet deployment." Capt. Wiley is a senior pilot and now Deputy Chief of the Public Information Division in the Office of the Special Assistant to the Commanding General, Headquarters, Strategic Air Command, Offhut Air Force Base, Omaha, Nebraska.



▶ This month's Flight Operations Round Table on the subject of "Specifications and Requirements for the Ideal Corporation Air Transport" was held at the Blackstone Hotel in Chicago just prior to the formal opening of the Corporation Aircraft Owners Association's Fifth Annual Meeting. From the comments of those who participated and the many kibitzers, all corporate pilots in Chicago for the CAOA Meeting, this Round Table was pronounced a success . . . and one vitally important to the executive flying branch of aviation because it gave corporate-plane operators an opportunity to discuss specific needs with several of the men responsible for aircraft design and who represented aircraft manufacturers and engine builders as well as aircraft service operators.

William W. Moss, Captain, Pan American World Airways, has flown approximately 12,500 hours, made 112 Pacific crossings, 265 Atlantic crossings and, according to an official "unofficial source," holds the non-stop London to New York record of 12 hours 59 minutes, March 10/11, 1951. Capt. Moss began his aviation career building model airplanes; he then graduated to gliding and soaring (National Soaring Contest at Elmira, N. Y., 1932), and learned to fly power planes as a Naval Aviation cadet at Pensacola in 1935, 36. He served with Bombing Squadron Three on the *Lexington*, the *Saratoga* and the *Ranger* until December, 1939. Capt. Moss joined Pan Am in December and flew Central and South America to Rio, mid-Pacific to Philippines and Singapore, South Pacific to Australia and New Zealand, Mid-Atlantic and Africa to Johannesburg.

Bill Moss is a member of the Institute of Aeronautical Sciences and the Society of Automotive Engineers, and is the Air Line Pilots Association liaison representative to the CAA/CAB Performance Committee. He was a member of the Foreign Survey Group of Prototype Aircraft Advisory Committee in 1951.



▶ Next Issue: SKYWAYS' Flight Operations Round Table for February is "Crew Coordination and Pre-Flight Preparation." Participants include representatives of the CAB, the Air Force, Navy, the Air Line Pilots Association, the airlines, the Air Transport Association, corporate-plane operators, and training device manufacturers.

executive pilot's report

Zero Reader and A-12 with Approach Coupler

by Herb Fisher

Chief, Aviation Development,
Port of N. Y. Authority

A glance into the cockpit of almost any executive airplane flying the business skyways today will give positive proof to the equipment-wise onlooker that corporate aircraft are among the best equipped in the world. Safety of operation in corporate flying is more than a mere goal; it is an established fact, and one that has built an enviable record for industrial and executive-type flying.

Flight safety and efficiency in corporate operations have been no accident. They have been attained through good judgment and expert flying on the part of the pilots, and through the acceptance and acquisition of the best in equipment, both aircraft and instruments, that have been developed.

Investment in Safety

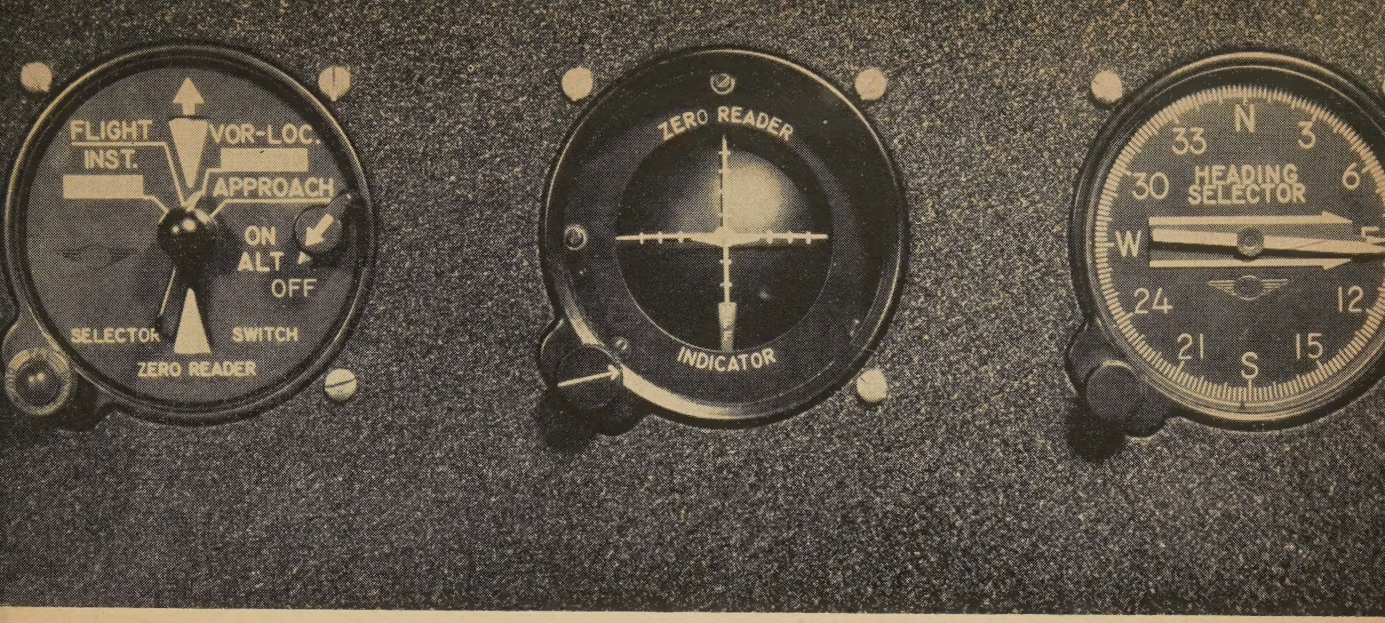
I might add here that there are some owners who have invested large sums of money for the best airframe to meet their personal comfort and business requirements, and yet have failed to protect that investment, their own personal safety and that of others by a shortsighted program of not obtaining adequate navigational facilities for modern day flight. Those who do not feel that a few extra dollars should be invested to assure at least their own safety, should enlighten themselves by studying in detail the present volume of air traffic, both enroute and at most metropolitan areas, during VFR, much less during IFR operations.

This flow of aircraft traffic is increasing at a tremendous rate and anyone who barges into the New York area, for example, during maximum IFR conditions with just the bare minimum of flight instrumentation better have the most experienced pilot in his employ and, above all, one who is absolute in his proficiency of instrument flying.

I know of one individual who would not approve the purchase of the most inexpensive ADF for his company airplane. Eventually, because of this stupidity and a lack of navigational aids, a forced landing resulted. Fortunately, no one was injured but this incident cost the company around $10,000 in labor—all because of someone top side who was not capable of evaluating the problem from a safety angle. Let's not ever be penny-wise and dollar-foolish where safety is involved.

Many U. S. manufacturers of airborne and ground navigational facilities have established outstanding records in the development of these modern aids. Two items entitled to special attention for the excellent job they've done for corporation flying are the Sperry A-12 Automatic Pilot with Approach Coupler and the Zero Reader Flight Director. Although both have been in operation for quite some time, I had never had an opportunity to acquire much flight time with them . . . a fact Sperry Gyroscope's George Wies reminded me of when we met at the very successful Corporation Aircraft Owners Association Annual Meeting and Forum in Chicago recently. We cast the die then and there, and I made a date to fly the Zero Reader and the A-12 with Approach Coupler installed in Sperry's venerable DC-3, N60777.

It had been a while since I had had an opportunity to fly one of the old Douglas DC-3 work horses, and it felt mighty good to sit once again in the left



PANEL COMPONENTS *of the Sperry Zero Reader Flight Director (above, left to right) are the Flight Director Selector Switch, the Zero Reader Indicator, and Heading Selector*

ZERO READER *Flight Director, mounted on DC-3 N60777's panel, is pointed out to Test Pilot Herb Fisher (below, in the left-hand seat) by Sperry's Capt. Edward C. Williams*

seat. All I can say to Don Douglas, Jr., is that the unprecedented reputation that this airplane has established over the past many years is the finest tribute that could be paid to his father and those involved in its original design.

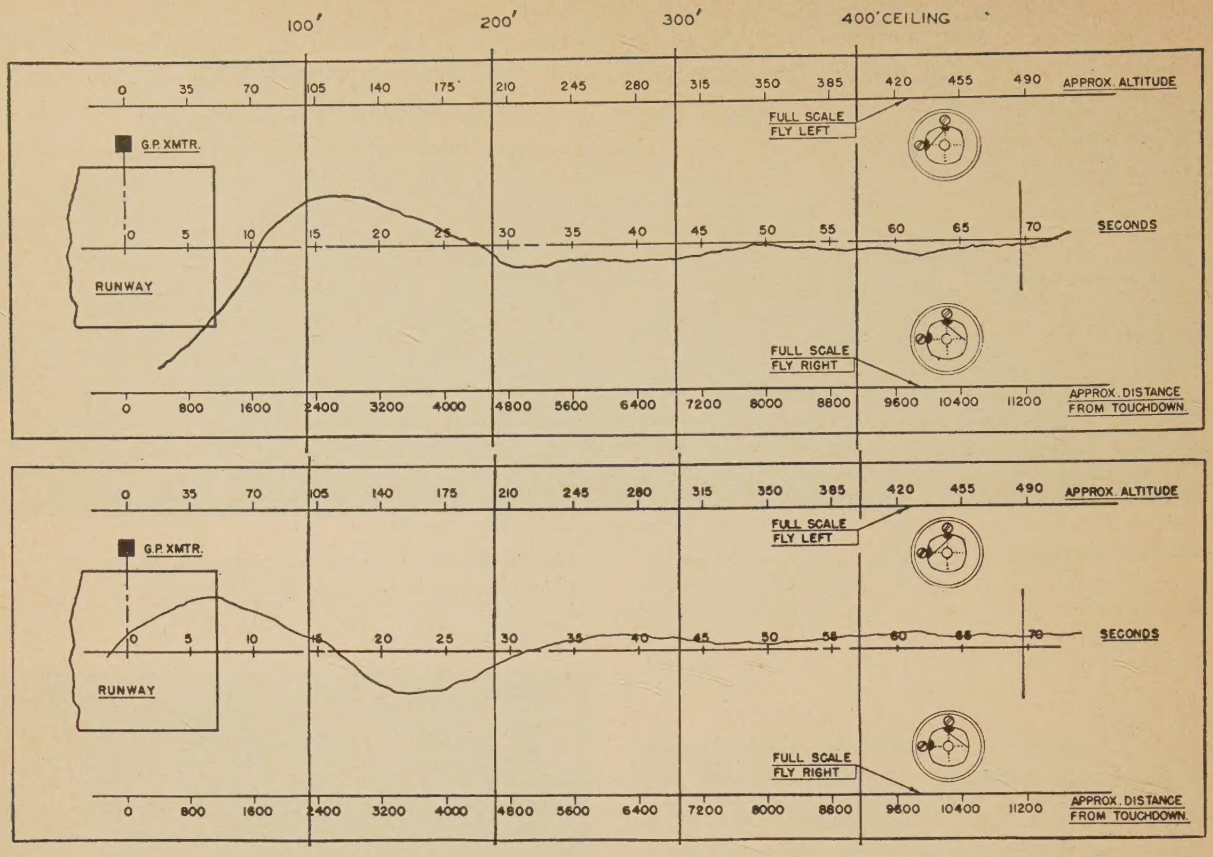
Evaluation Flight—Zero Reader

Capt. Ed Williams, Sperry Pilot and former Colonial Airlines airman, brought the DC-3 to Caldwell-Wright Airport in New Jersey to pick me up. With him were Flight Engineer Hal Berberian, George and a couple of friends.

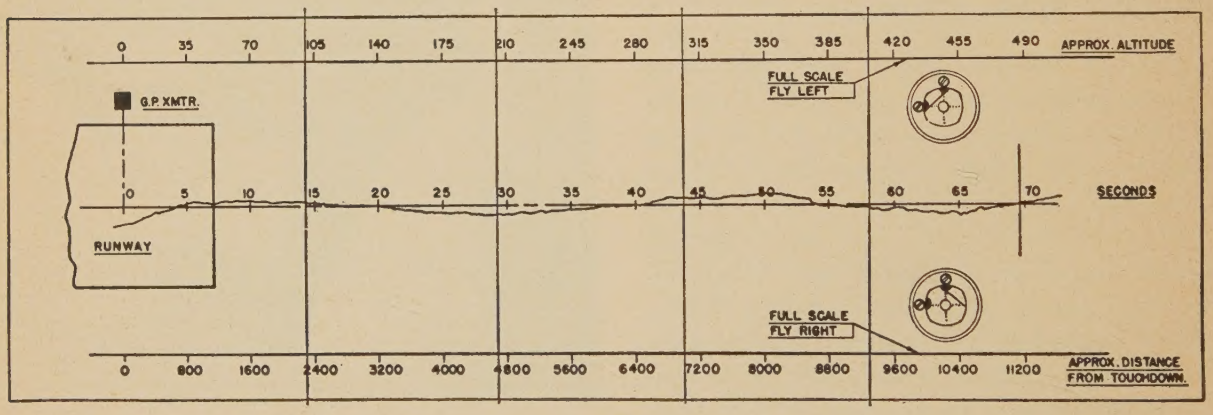
Ed yielded the left-hand seat to me, ran through a check list, and advanced the throttles for take-off. No sooner was the tail up than Ed put the Douglas into the hands of the A-12 Gyropilot. We cleared the field boundary right down the middle of the runway, crosswind or no. The air was moderately rough as we headed for the Teterboro ILS, all in the hands of the A-12. Just before getting there, Ed switched off the A-12 and I took over with the Zero Reader Flight Director to get the feel.

No matter how experienced a pilot may be in many types of aircraft and at many phases of flying, there is always a momentary awkwardness and roughness attendant to handling new or strange equipment—and the Zero Reader was relatively new to me as far as using it was concerned. Ed put the Selector Switch on Flight Instrument and adjusted the Heading Selector and Altitude Switch to indicate a transition course to the TEB ILS. It took me a few minutes to be convinced that the Zero Reader didn't have to be gentled. If the magnetic

DETAILS *of the Zero Reader control unit are explained to Herb by Sperry's Flight Engineer Hal Berberian (below). Herb found Zero Reader extremely valuable equipment*



CHARTS *(above) are ILS flight recordings made by aircraft being flown manually using conventional cross-pointer meter*



GRAPH *(above) is an ILS localizer recording made by aircraft during an automatic approach with the Sperry A-12 Gyropilot*

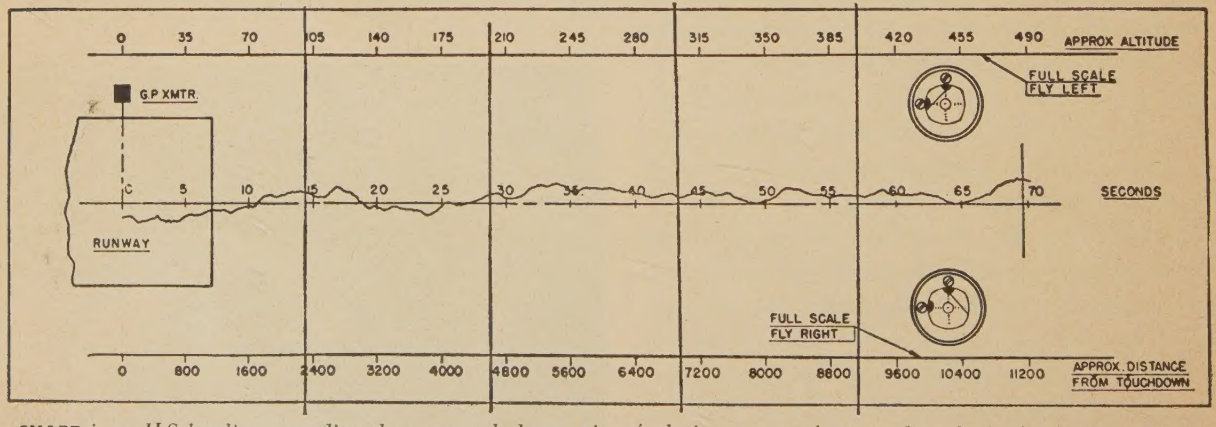


CHART *is an ILS localizer recording that was made by an aircraft during a manual approach with the Sperry Zero Reader*

course selected was shown to be off to the side, as with ILS or VOR, it was not necessary to "milk" my way back cautiously with successive bites at the heading or ease my way back up to the altitude. With the Zero Reader, you just keep putting in black elevator and rudder until the indicator cross-bars "zero" on the little airplane in the center of the dial, and hold them there. By so doing, the airplane executed a perfect "turn-on" to the desired course and levelled off at the agreed altitude.

We deliberately got off course a couple of times to actually compare the additional mental and physical effort required to resume course with just ILS as against the simplicity of the Zero Reader. When we crossed the outbound course of the ILS on what would be the start of the procedure turn heading, we held course for the required minute. Then, in two successive adjustments (usually 90°, but always less than 180°) of the Heading Selector as I banked into my turn back, Ed cranked in the return heading to intersect the localizer inbound. The vertical bar moved over to the right, and I was surprised at how exactly the equivalent of a standard-rate turn angle of bank restored the vertical bar to center. Right on the minute, it became necessary to roll out to hold the bar zeroed, and there we were, right on the money.

As we came up on course and as the ILS cross-pointer needle approach center, Ed snapped the Selector Switch to "localizer" position. Again, keeping the indicator zeroed, the airplane rolled out onto the inbound course and glued on without a single pilot-computed slice to "capture" the course centerline or to hold it. As the ILS Glide Path needle crept down to level position, Ed snapped the switch to "Approach" position and the same process of keeping the cross-bars "zeroed" proved so much easier than the familiar and standard ILS course manuevering that it took several approaches to convince me that I wasn't just being lucky. Again, deliberate and almost violent deviation by Ed from the Course and Glide Path before returning the controls to me amazed me with the ease at which I again tied down both almost instantly.

The TEB ILS went sour at this point and we departed for Idlewild to check their approach system over Jamaica Bay. (Incidentally, being sensitive to the merit of doing nothing to spoil the efforts of the industry to avoid unnecessarily low or noisy flight patterns, all our flying, except when on the actual glide path to the instrument runway, was done well above the required minimums and strictly away from populated areas. In fact, most of it was done over water or the New Jersey marshland!)

It was baffling that two systems of flight path guidance could look so similar on the surface and be so dissimilar in ease of desired accomplishment and accuracy. By way of demonstrating the remarkable ability of the Zero Reader as well as to simulate an emergency, Ed had me start one approach *outbound* over the Outer Marker (*4 miles* from the end of the runway) at *2,000* feet! To make it more interesting (as if it wasn't already!) one engine was pulled. I still can't believe it but in one sweeping, descending turn, the nose of that DC-3 was lined up for the runway right over the middle marker, on the glide path. I did nothing but keep those cross-bars glued on "zero" until I looked up as Ed took over for the pass across the runway.

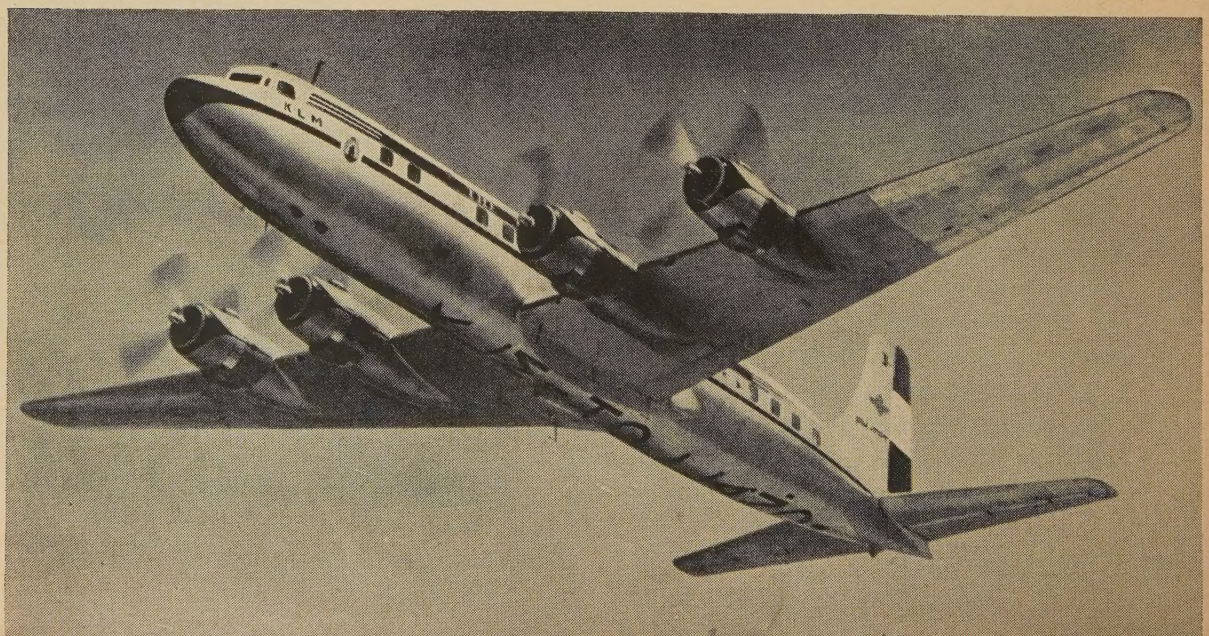
I was interested in seeing how Sperry's gadget handled the outbound course of the ILS, or more important, the back course approach. To anyone familiar with the reversal of the Localizer needle in these two instances, the results should be interesting. Remembering that the Localizer needle really only tells you which of the two hemispheres, Blue or Yellow, you are flying in; or between them, if on course; it is readily understood why you have to fly away from the needle to "entice" it back towards center rather than to it as in front course flying. For instance, inbound the Blue is on your right, and if you are right of course, (*Continued on page 57*)

CHECKING *the DC-3, George Wies (right) of Sperry and Herb Fisher who flew evaluation flight, inspect trim tab*

a Pilot's view of AUTOMATIC FEATHERING

by William W. Moss
Capt. Pan American World Airways

Automatic feathering of propellers of transport category airplanes has been the subject of considerable controversy ever since the feature was introduced first on the Martin 202 in 1947. Not only has the device been criticized by many segments of the aviation industry as unsafe (because of its inherent complications) but it has been strongly opposed by the pilots for the additional reasons of the 1) large increased gross weights for take-off which it permitted, with the 2) associated deterioration of all around take-off performance and climb. Even the method of its approval by the government regulatory agencies has been criticized. Yet, in spite of the fact that representatives of practically all the organizations of the U. S. air-transport industry, manufacturers, operators, pilots, and flight engineers are in basic agreement that substitution of a system of "automatic indication" of power failure or of "semi-automatic feathering" would provide greater safety, there appears little chance at this time that automatic feathering will be replaced. The question can well be asked, "if automatic feathering can be replaced by systems offering greater safety, and this fact is generally agreed upon, why is it not done immediately?" The key word to the answer is "weight," but that in itself is not the whole answer to a complicated problem, and in order to attempt an answer to the question it is necessary to review the whole situation from



AUTOMATIC FEATHERING *system installed on long-range version of DC-6B permitted 4,000-lb. weight increase*

the beginning. The introduction of automatic feathering to the air-transport picture caught many industry people by complete surprise, and the history of its development is interesting. At the end of World War II in 1945, the aircraft manufacturers' attention turned to the development of transports which could meet the then new performance requirements of Part 04 of the Civil Air Regulations, which laid down minimum climb requirements for all stages of flight, climb, enroute, approach, and landing, based on a sliding scale of stalling speed squared.

It soon became obvious that, for most airplanes, the maximum take-off gross weight was going to be governed by the plane's ability to meet the take-off requirement of a rate of climb in feet per minute of $0.035V_{s_1}^2$. As laid down in CAR 04b.120(b), the configuration of the airplane in demonstrating this required rate of climb was to be:

(1) Wing flaps in the take-off position;
(2) Cowl flaps in the position normally used during take-off;
(3) Center of gravity in the most unfavorable position permitted for take-off;
(4) *The critical engine inoperative, its propeller windmilling with the propeller control in a position normally used during take-off;*
(5) All other engines operating at the take-off power available at such altitude;
(6) The speed equal to the minimum take-off safety speed, V_2;
(7) The weight equal to maximum take-off weight for that altitude;
(8) The landing gear retracted.

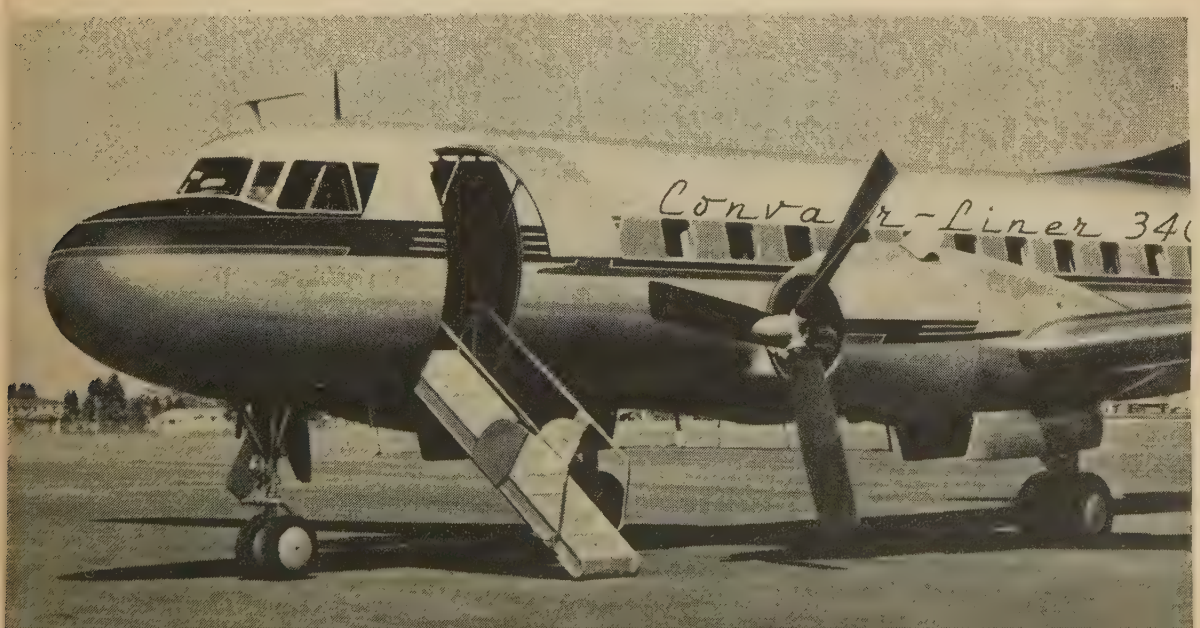
(*Note: the italics is by the author.*)

This appeared to be pretty clear cut and final, except to a few in the manufacturing companies. Naturally, there was serious consideration given within the design staffs as to how to get the maximum allowable gross weight approved for the new transports and somebody thought up the idea of automatically feathering the propeller in case of an engine failure and then demonstrating the required rate of climb with the propeller feathered instead of with it windmilling as specified in CAR 04. Just who the father of the idea was is not known, but the first industry hint of this new development was given by Dr. W. Bailey Oswald, Douglas Aircraft Company's outstanding design thinker, in his paper "Designing to the new CAA Transport Category Performance Requirements" at the SAE National Aeronautics Meeting, October 4, 1946. And hint it was, for the only mention of automatic feathering was in two obscure footnotes.

The next this development was heard of was in the CAA Safety Regulation Release No. 246, of June 3, 1947, titled "Approval of Automatic Propeller Feathering Installations," in which the policy was laid down of approving auto-feathering installations if they met certain design standards, and in which the policy was laid down of granting full credit for the automatically feathered propeller in meeting the $0.035V_{s_1}^2$ climb requirement. The philosophy behind this performance credit approval was stated as follows:

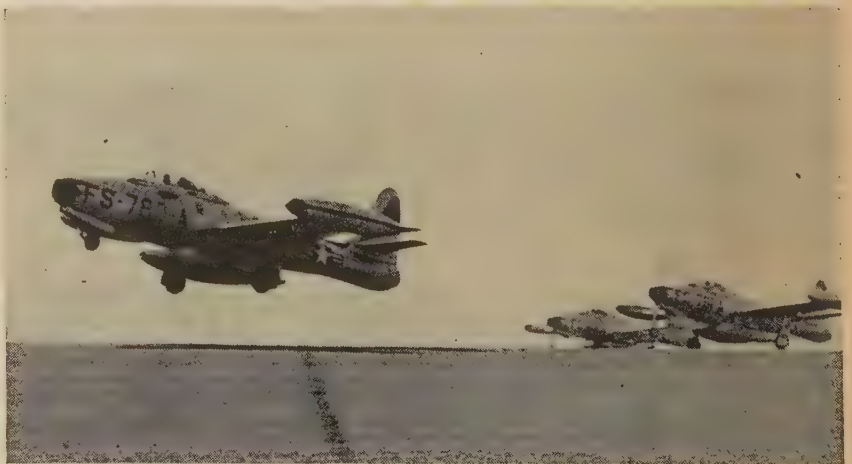
"*Civil Air Regulations Amendment 04(b) does not specifically provide* (*Continued on page 47*)

PADDLE-BLADED PROPS *on the Convair-Liner 340 set up heavy drag which necessitates rapid feathering of the failed engine to clean up airplane and give positive performance*

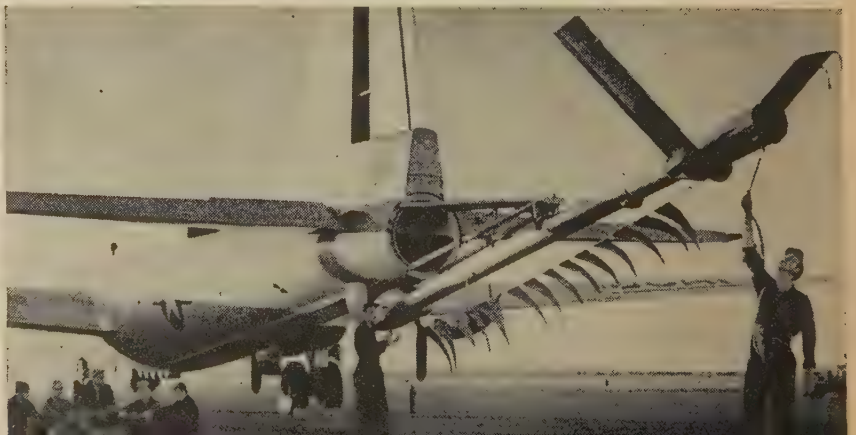


BRIEFING—*Lt. Col. John W. Lafko of Poughkeepsie, N. Y., gives the F-84 pilots last-minute instructions prior to their take-off on ocean hop*

LINE-UP—*Lined up at Travis Air Force Base for take-off on mass hop across the Pacific to Japan are the F-84's of Strategic Air Command*



TAKE-OFF—*Roaring off runway is one of first Thunderjets bound for Japan. The 31st was deployed from Georgia to Japan in 11 days*



TANKER—*Crew of KB-29 tanker plane was up early in the morning to get a head start on the fast jets to be refueled in flight over the Pacific*

Operation FOX PETER ONE

by Capt. T. J. Wiley

Global mobility of both fighters and bombers is now a reality in the Strategic Air Command. SAC's flexible fighters joined big bombers in the global mobility ranks in July when the 31st Fighter-Escort Wing was deployed from its home station at Turner Air Force Base, Albany, Georgia to Japan in just 11 days.

Called "Operation Fox Peter One," it was a 10,670-mile deployment with in-flight refueling used on two legs—Turner to Travis AFB, California and Travis to Hawaii. After reaching Hawaii, the *Thunderjets* island-hopped to Midway, Wake, Eniwetok, Guam, Iwo Jima and into Japan.

Operation Fox Peter One was written into an operations order at Strategic Air Command Headquarters in Omaha, Nebraska and dispatched to Turner AFB on June 25.

The code designation of Fox Peter One was selected for the deployment because under the old phonetic alphabet "Fox" designated fighters; "Peter" was for Pacific and "One" meant it was the first time jet fighters had attempted to span the Pacific.

The operations order gave the 31st FEW just nine days to prepare for the initial hop from Albany to Travis AFB, California, on July 4.

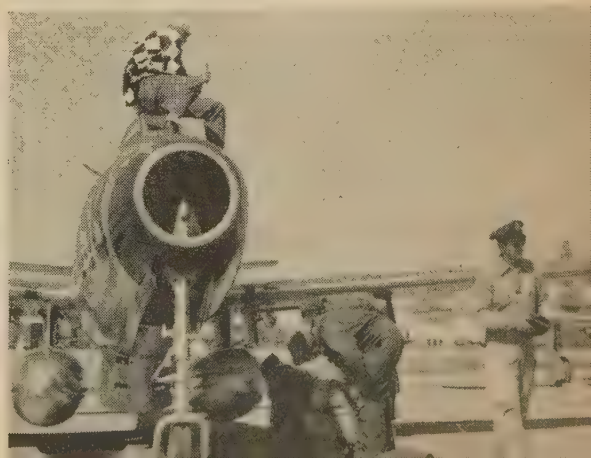
Every unit of the Strategic Air Command has a mobility plan, a plan set up months in advance and for use in case of a sudden deployment. The essence of the plan is to have personnel, supplies, equipment and facilities in position and ready for

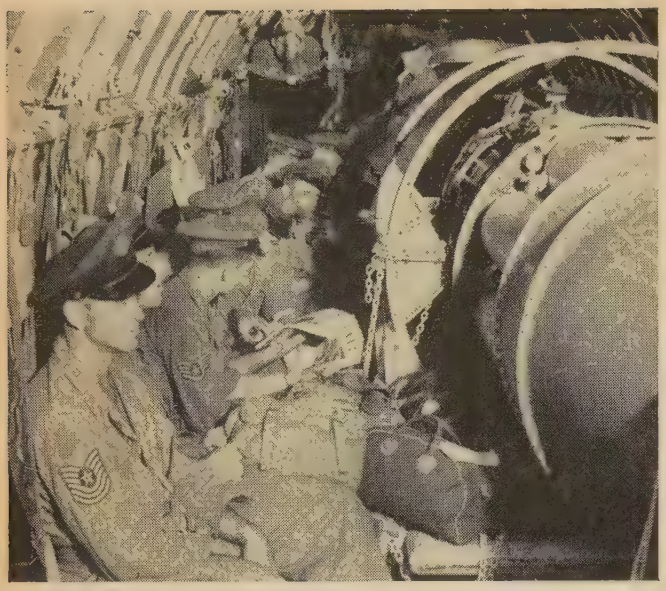
"The deployment of the 31st Fighter-Escort Wing to Japan by using in-flight air refueling is the culmination of several years of development by the Air Force and enables Strategic Air Command fighters at last to join our larger aircraft with full global mobility."

Curtis E. LeMay
Commanding General
Strategic Air Command

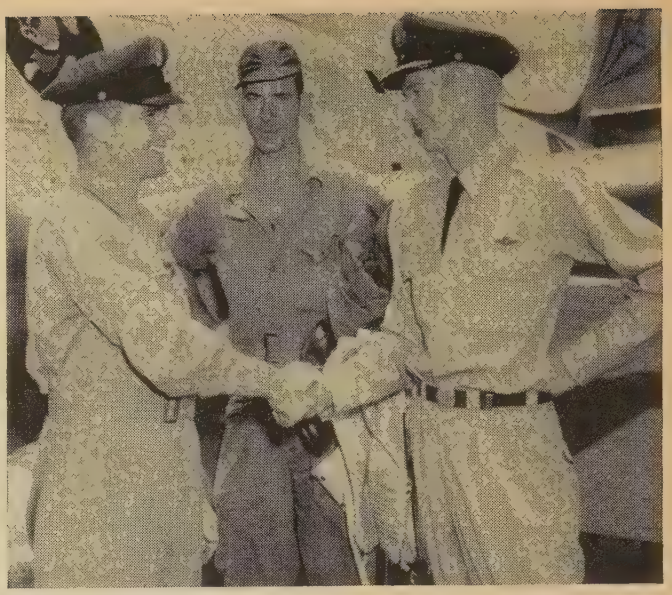
BASE REFUELING—*Base refueling teams pumped thousands of gallons of jet fuel into tanks of F-84G's for flight from Georgia*

GROUND CREWS—*As soon as pilots left their cockpits, mechanics worked on planes for the next hop*





CREWS—*Chief concern was for these boys who worked on jets all day, then boarded transports to follow jets to next stop*



FIRST DOWN—*Col. J. Duckworth (right) C.O. of Hickam, greets Major R. Keen, first to land after hop from Calif.*

immediate use. The 31st FEW mobility plan went into effect minutes after the operation order reached Albany.

Shortly after the "Fox Peter One" operations order reached Turner and until the *Thunderjets* took off on the first leg of its 10,670-mile trip, transport planes from Strategic Support Squadrons and Military Air Transport Service hauled supplies and personnel associated with the deployment away from the base.

Some of the stops along the route to Japan lacked proper refueling equipment, so huge C-124's loaded complete fuel trucks into their gaping cargo bays. Control teams, made up of officers whose job was to complete preparations for the arrival of the ocean-hopping *Thunderjets* at various island bases, departed early in MATS planes. The necessary administrative complement of the wing was transported to Misawa, Japan, to make sure the unit could begin immediate combat operations, if required.

The big day was July 4, and hundreds of base personnel and relatives of the departing unit were on hand when Colonel Dave Schilling gave his heavily-loaded *Thunderjet* 100% throttle, roared down the runway and sped over Albany. He was followed by three squadrons—and the mission was under way.

The first leg, from Albany, Ga. to Travis AFB, was by design similar to the second leg—the hazardous 2400-miler over-water jump from California to Hawaii. Aerial tankers were positioned much the same way they would be over the Pacific.

Refueling took place over Texas and it proved successful, although some valuable lessons were learned that resulted in changes in the original over-the-Pacific refueling plan.

The new tactics were worked out thoroughly with the crews of the tankers by Colonel "Dingy" Dunham, Deputy Commanding Officer of the 31st FEW.

To observe the new tactics in operation, Col. Dunham made the flight out into the Pacific with the tankers when the first squadron of *Thunderjets* departed Travis on July 6. Completely satisfied, he returned to Travis and flew a jet to Hawaii on July 8.

Col. Schilling led the first squadron that departed California, but damaged a vital piece of refueling equipment on his fighter during an attempt to make the hook-up, and had to return to Travis. Major Robert J. Keen, of Jacksonville, Florida, commanding officer of the 307th Fighter Squadron, assumed command when Schilling turned back and he guided the fighters safely to Hawaii.

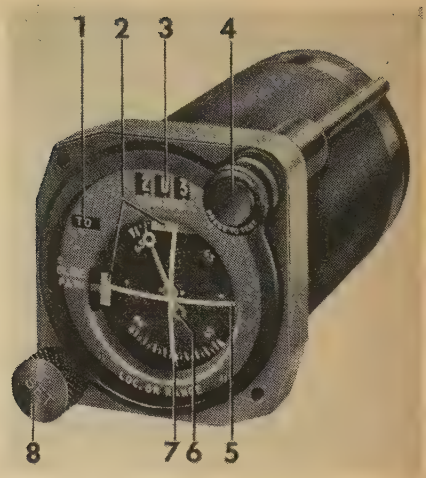
Five hours and 27 minutes after leaving California, Major Keen's squadron landed at Hickam AFB. Col. Schilling brought the 308th Squadron across on July 7, and Col. Dunham led the 309th into Hawaii on July 9.

As a safety precaution, the Boeing KB-29 aerial tankers were stationed at a spot on the route to Hawaii within the point of no return to Travis, so the 31st pilots could return to California if they experienced any trouble.

The flying tankers also were stationed at a spot much closer to Hawaii so (*Continued on page 55*)

VHF Navigation with the Omni-Mag

by *Harvey A. Senior*



BENDIX OMNI-MAG, *face view, consists of: 1. To-From Indicator; 2. Flag Alarm; 3. Selected course Indicator; 4. Marker Beacon Lamp; 5. Horizontal Pointer; 6. Relative Heading Pointer; 7. Vertical Pointer; 8. Course Set Knob. The Omni-Mag mounts in a standard 3-inch panel cutout. Weight of unit is 3 lbs. 4 oz.*

The task of flying the modern multi-engine airplane on instruments, particularly during that critical period from airway to runway of a terminal airport, admittedly places a burden upon the pilot that at times approaches the limit of human capabilities insofar as mental strain and power of concentration are concerned. The primary contributing factor to this burden is apparent to even the casual observer of the plane's flight compartment—the large number of dials, indicators, knobs, levers, and controls which cover just about every available surface. During instrument flight, these myriad gadgets are the means by which the pilot must fly and navigate his airplane.

This article will review briefly some of the factors involved in acquiring this great amount of instrumentation and will then describe an equipment of recent design which actually combines the functions of a control unit, an instrument, and an indicator, with an additional highly useful indication not heretofore available directly, within the panel space

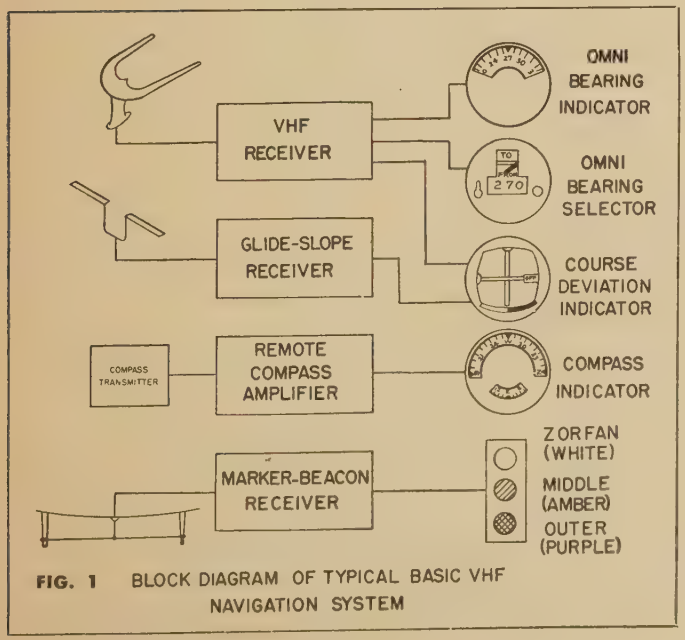


FIG. 1 BLOCK DIAGRAM OF TYPICAL BASIC VHF NAVIGATION SYSTEM

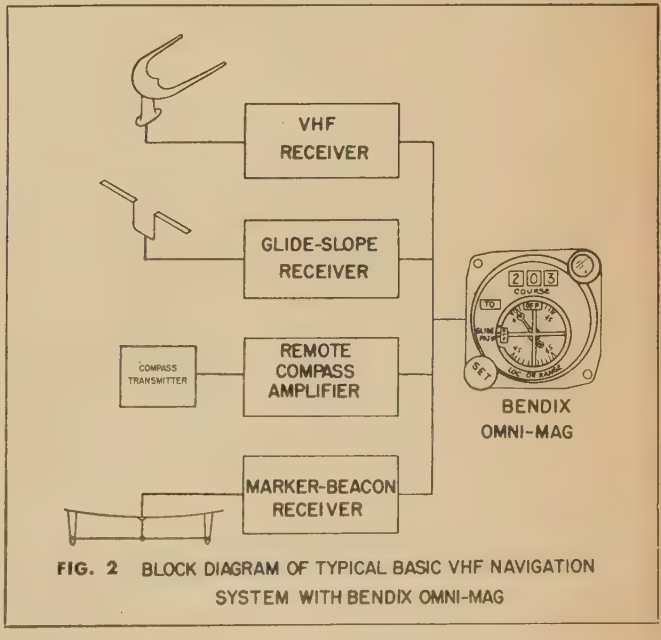


FIG. 2 BLOCK DIAGRAM OF TYPICAL BASIC VHF NAVIGATION SYSTEM WITH BENDIX OMNI-MAG

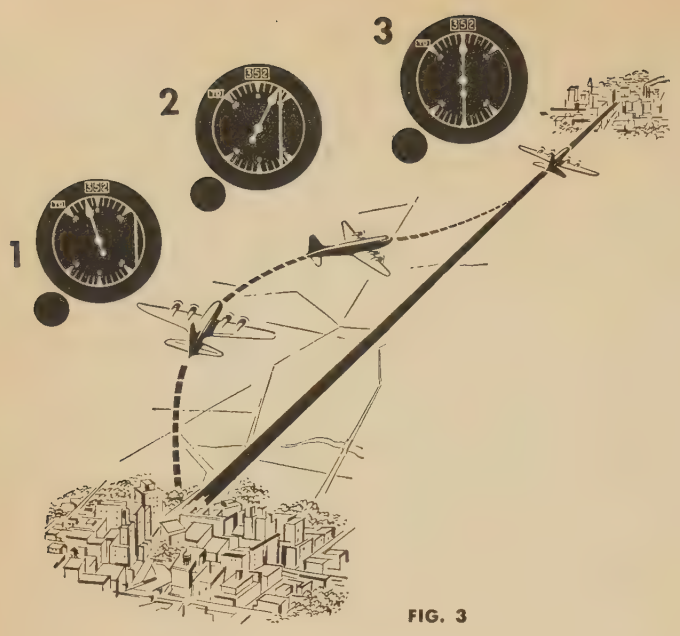


FIG. 3

1. *The bar indicates your desired course; it says your course is to right. Arrow indicates way you are headed; it says you are flying away from course. Turn right*

2. *Arrow now shows you are approaching course at 45°. Bar has moved showing you are nearing your course. Decrease rate of turn*

3. *You held heading in #2 until course bar started to move toward center, then turned to left at a rate which kept heading arrow aligned under course bar. Indicator shows you are on course*

required for a single instrument. It is readily apparent that herein may lie the solution to the basic problem—to reduce the number of separate instruments and controls while retaining, or preferably increasing, the functions provided.

Early efforts in the art of instrument flying were based upon use of a few attitude instruments—gyro horizon, turn-and-bank, rate-of-climb—to maintain level flight within reasonable limits; and upon use of navigation instruments—compass, directional gyro, altimeter—to maintain a given heading and to make accurate turns from a heading. A few engine instruments, control knobs, levers, and flight controls just about rounded out pilot responsibilities. With these limited means, a pilot could take off under visual conditions, go on instruments when aloft, and navigate to his destination by dead reckoning, as long as he could resume visual techniques for landing at destination.

Cross-country navigation was adequate for the traffic density of that time, but was understandably inaccurate when traffic started to increase. Also, completion of a flight under condition of restricted visibility depended upon visual recognition of the terminal airport—a solid overcast often moved in and necessitated return to base. The low-frequency radio range provided highways in the sky which gave greater assurance of geographic location on cross-country flight but necessitated placing a tuning control, volume control and headphones within easy reach of the pilot, in addition to finding a place for the receiver, its antenna and power supply. This was the beginning of a trend which has continued until the present—each added equipment has presented additional dials for the pilot to look at, additional knobs for the pilot to push or turn, and additional weight for the plane to carry.

Increased accessory equipment can be offset somewhat by supercharged engines of greater power, which in itself becomes a vicious circle as such engines require additional instrumentation and controls due to more stringent operational requirements. To illustrate, the unsupercharged engine formerly required only tachometer, oil pressure and oil temperature gauge and often only had a throttle. The modern engine with constant-speed propeller necessitates a manifold pressure gauge, fuel pressure gauge, cylinder temperature gauge, mixture control, propeller control, cowl flaps control, oil cooler flap control, and so on, ad infinitum. One more point, instruments and controls for one engine are doubled for two, tripled for three, and quadrupled for four engines.

A parallel case can be drawn for each section of the airplane. Whereas the pilot formerly dealt with stick or wheel and rudder pedals, with possibly an adjustable stabilizer for longitudinal trim, he now has trim tabs having indicators and control knobs in the flight compartment for all three axes—pitch, bank, and yaw. Whereas the landing gear formerly was rigidly fixed to structure, higher speeds demanded retractable gear with control lever and position indicator needing pilot attention. These two examples serve to indicate the trend. While such development is not a short-term affair but is spread over a period of several years, its effect upon

pilot duties is nonetheless extremely apparent.

An accelerating factor now enters the picture—*systems*. The first such is the well-known Instrument Landing System (ILS). It is a known fact that this equipment permits the pilot to navigate his plane from airway to final approach to the runway with a greater assurance than formerly possible. However, the components required to do so number two radio receivers, associated tuning controls to be operated by the pilot and a dual-pointer panel-mounted indicator. A related marker-beacon receiver requires an antenna and three indicator lights demanding pilot attention at certain intervals. For another example, the direct-view compass is replaced by the remote-indicating gyro-stabilized compass in the interest of stability and dead-beat accuracy, thus adding a transmitter, amplifier, interconnecting wiring, and a rather weighty indicator in place of one self-contained indicator.

Make no mistake, every one of the improved equipments has made a very real contribution to the safety and reliability of airplane flight, particularly instrument flight. Consider the problem from the pilot's viewpoint for the moment. Airplanes are continually growing larger, faster, and more complex as application engineers hasten to place the efforts of design engineers into practice. Here is the pilot, then, strictly in the middle of a squeeze play between having more and more dials to watch, instructions to hear, levers to push, pull or turn while higher speeds are giving him less time to devote to each necessary task and less time in which to make vital decisions.

What is a solution? Well, for one thing, it has been customary to provide the various dials and controls in the most logical arrangement and for the pilot to coordinate indication and requisite action by means of the human brain. Grouping of related instruments and controls would seem to have promise of relief in this direction. Instead of looking at an indicator here, then an indicator over there, then to the right for manipulation of a control knob, and back to the first-mentioned indicator for a check on response, the pilot would reach for a control at a location close to the indicating instrument and could observe (*Continued on page 50*)

DRAWING *is step-by-step illustration of Omni-Mag indications during a typical Localizer approach*

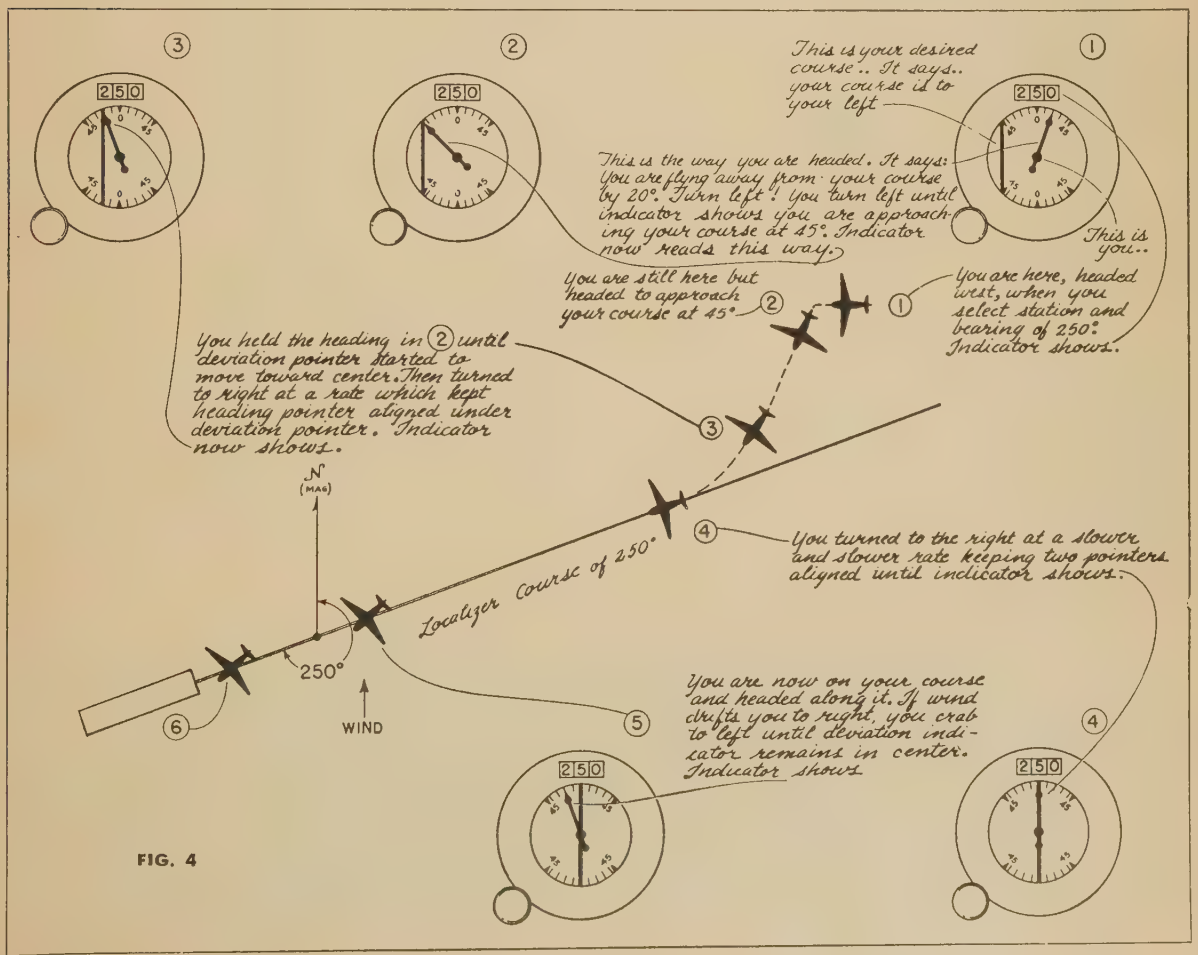
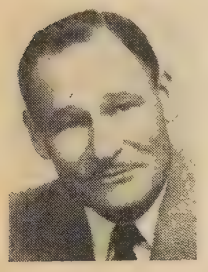


FIG. 4

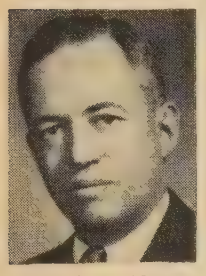
R. M. Harmon

RALPH M. HARMON, Chief Design Engineer for Beech Aircraft Corp., has been in the commercial aircraft field for 17 years. Past 13 years Mr. Harmon has been very active in design, development of Beech airplanes.



L. B. Littrell

LESTER B. LITTRELL, Gen'l Mgr. Aircraft Operations, Pacific Airmotive, has been active in aviation industry for 26 years. Prior to his PAC work, Mr. Littrell spent six years with CAA, two years as pilot for W. R. Hearst.

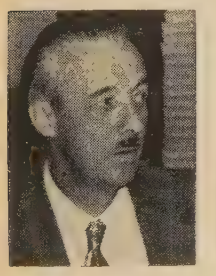


W. B. Belden

WILLIAM B. BELDEN, a Director of CAOA, is Assistant Secretary, Assistant Counsel of Republic Steel Corp. A charter member of CAOA, he was its Chairman from 1946 to 1951. Mr. Belden is graduate of Cornell.

Cole H. Morrow

COLE H. MORROW, Chairman of Board of Directors, CAOA, is Chief Plant Engr., J. I. Case Co., Racine, Wis. He is member of Civil Aviation Air Defense Advisory Board; National Air Transport Coordinating Committee.



George A. Page

GEORGE A. PAGE, Director of Research and Engineering, Aeronca, is one of the leaders in field of aircraft engineering. He is credited with designing, developing, producing, flying over 100 basic types of aircraft.

CAPT. HARRY R. VAN LIEW has been United Air Lines' pilot for 20 years, except for three years during the war as Marine Corps pilot. He formed his own aviation consultant company, Executive Air Transport Co., in 1951.

R. W. LANE, Chief Pilot, Food Machinery and Chemical Corp., was an ATC pilot during war and was awarded DFC and Air Medal. He holds an ATR; has chalked up 9,000 hours. Mr. Lane joined FM in 1946.

WALTER C. PAGUE has been associated with the Corporation Aircraft Owners Association since 1946. He is Chief Pilot, ARMCO Steel Corp., holds an ATR and has had 9,000 flying hours. He flew for Navy during World War II.

H. P. HENNING, Engineer-Check Pilot, General Motors Corp., has been with GM for 8 years. He holds an ATR, single and multi-engine, land and sea; and has logged 12,000 hours. Hes been an active pilot since 1925.

JERRY H. GERTEIS, Assistant Chief Engineer with Cessna Aircraft, has been actively associated with design, development of the Cessna 140, 170, 190 and L-19 models since 1942. He is a member of IAS and the SAE.

JAMES A. ROGERS has been actively engaged in aviation in and around New York since 1933. Spent three years during the war as an ATC pilot, and joined Swiftlite Corp., in spring of 1951. He has logged over 8500 hours.

R. T. AMIS, JR. is President of Aero Design and Engineering Co., Oklahoma City, Okla., and is a partner in the Amis Construction Company which has used aircraft as major means of transportation for more than 10 years.

RALPH E. PIPER, Chief Pilot of Monsanto Chemical Co., learned to fly in 1936. He spent the war flying the Hump and earned the Air Medal, DFC and Presidential Citation. Mr. Piper has held an ATR since 1947.

E. T. WILLIAMS has been a member of North American Aviation's Confidential Design Group for past six years. He attended Purdue University, joined North American in Dallas in 1943; moved to Los Angeles in '45.

E. M. LESTER, Assistant General Mgr. of Engine Div., Fairchild, has had 20 years of experience in aircraft engine field. An experienced pilot, Ev Lester has logged 2,000 hours in everything from fighters to bombers.

LOCK L. YORK, Assistant Sales Mgr., Aircraft Engine Div., Continental Motors Corp., is a Naval Aviator, a Lt. Comdr., USNR, presently on inactive duty. He holds Commercial ticket, single and multi-engine, and an A&E.

HENRY W. BOGGESS, Director of Aviation, Sinclair Refining Co., has specialized in the management phases of aviation for many years. He organized Sinclair's Aviation Dept. which has centralized jurisdiction over 20 company airplanes based at 12 locations. Mr. Boggess' department is responsible for acquisition, maintenance and scheduling of Sinclair's executive aircraft fleet. Mr. Boggess is private pilot, flies his own plane; is member of American Society of Safety Engrs.

Capt. H. R. Van Liew

R. W. Lane

Walter C. Pague

H. P. Henning

Jerry H. Gerteis

James A. Rogers

SKYWAYS FLIGHT no.4 OPERATIONS ROUND TABLE

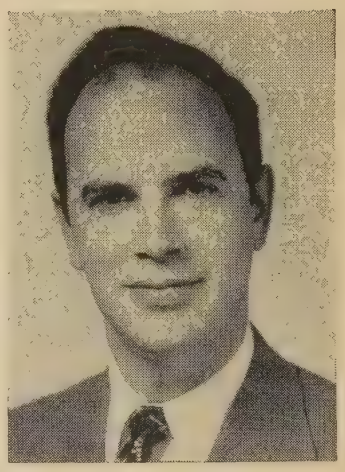
Specifications for Ideal Corporate Air Transport

R. Dixon Speas (*Aviation Consultant*): "These Round Table discussions initiated by SKYWAYS have been an excellent idea. They have been well administered and well received within the industry, perhaps because the Round Table formula is one of the fundamental ways we have of doing things in this country—of putting ideas on the table and discussing them.

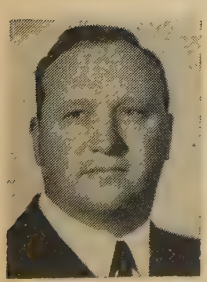
"In conducting this forum on the specifications and requirements for the ideal corporation air transport, it seems to me the subject breaks itself down into two phases: 1) the general design of the airplanes we are talking about, that is, as to range, payload, speed, runway length required, such safety items as fire protection, crash protection, and other detailed specifications; 2) the comfort conveniences such as pressurization, interior layouts, floor plans and steps, and then flight items such as controls and cockpit visibility.

"The attendance at this Round Table divides itself in good accord. We have operators, aircraft manufacturers, and engine manufacturers. From the operators we can obtain their considered opinions regarding requirements; and from the producers, their estimates of their ability to meet those requirements and, perhaps, some basics in the matter of costs.

"Cole Morrow, Chairman of the Board of Corporation Aircraft Owners Association, recently conducted a very comprehensive survey among executive-plane operators, and has come up with some interesting figures relative to what these operators want in an air-



R. DIXON SPEAS, moderator for this Round Table, received his engineering education at MIT, and his flight training at Boeing School of Aeronautics. He was with American Airlines for 10 years, and at time of his resignation in 1950 he was Special Assistant to the President. He spent a year and a half as U.S. representative on AVRO Jetliner project, then opened his own Aviation consultant office.



R. T. Amis, Jr.

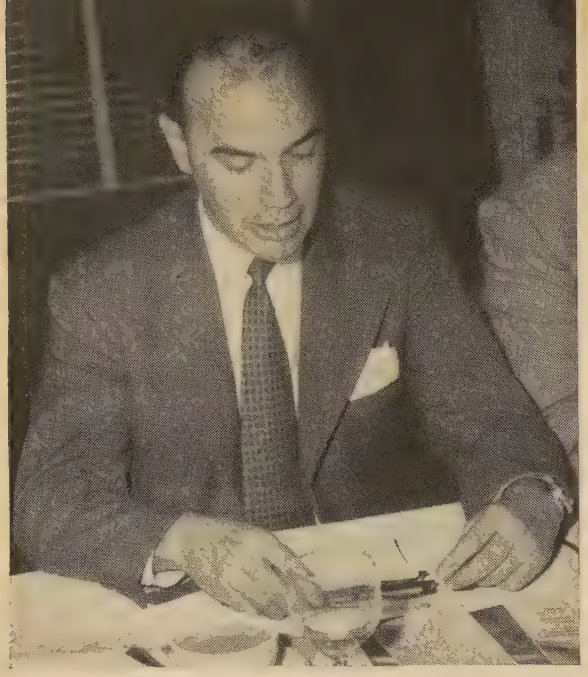
Ralph E. Piper

E. T. Williams

E. M. Lester

Lock L. York

H. W. Boggess



MODERATOR *of the Round Table, R. Dixon Speas, has been associated with the air transport industry for many years*

plane. Cole has agreed to make the results of this survey known to us, and after he has completed his report, we'll ask the operators here to give us their views on certain specifics. Following that, we'll move on to the aircraft manufacturing phase and get some opinions and thoughts from the engineers and designers that are here to represent the manufacturers, both airplane and engine."

Cole Morrow (*Chairman of Board, CAOA; Chief Plant Engr., J. I. Case Co.*): "This question of what do corporation operators want in an airplane has been a topic that's been kicked around a great deal within the industry. CAOA tried to bring it to a head or summarize it via a questionnaire which we mailed to a large number of users. Despite the short time interval between the mailing out of the questionnaires and getting them back for study, we received remarkable cooperation . . . an indication to me of the operators' tremendous interest in getting a suitable airplane for their use.

"The survey shows that the aircraft presently being operated by these companies include B-23's, DC-3's, *Lodestars*, Twin Beech's, Grumman *Mallards*, Grumman *Widgeons*, B-25's, Lockheed *Venturas*, de Havilland *Doves*, Cessna 190's, Beech *Bonanzas*, Ryan *Navions* and Aero *Commanders*.

"The principal aircraft operated are DC-3's, *Lodestars* and Twin Beech's. The Twin Beech and DC-3 ran about 50-50, with slightly fewer *Lodestars*.

"The average range of flights being made figure out to be 450 miles; with the maximum range of flights, 1,150 miles. I'd like to point out here that a preponderance of DC-3 operators reported 1200 miles as their maximum range, which is just about the maximum range of their airplane. Therefore, you can see that this figure of 1,150 miles is somewhat influenced by the kind of aircraft being operated.

"Next, the average number of hours of utilization of the airplane per year figures out to be 596 hours.

"The size of the airplane desired was divided into three different passenger-capacity groups: 4 to 6 passengers; 6 to 12 passengers; and more than 12 passengers. In the 4-to-6 category, 13% want a plane of that size that will carry an average of 5. In the 6-to-12 passenger group, 60% want an aircraft of that size with an average passenger capacity of 8.5. Twenty-seven percent want an airplane that will carry more than 12 passengers, with an average of 13.3 passengers.

"As far as cruising speed is concerned, the average of all questionnaires was 256 mph. In breaking that down, 15% want an airplane that cruises at 200 mph; 4% want 225 mph; 48½% want 250 mph; 6½% want 275 mph, and 26% want 300 mph.

"Analyzing the cruising speed requirement even further, in the 4-to-6 passenger category, the average speed requested by those operators is 207 mph. In the 6-to-12 place airplane, 256 mph is the average speed requested. Those who want a 12 or more passenger airplane, request an average speed of 273 mph.

"The question of pressurization came next, and it was listed as a requirement by 80%. Only 20% did not want pressurization.

"Tricycle gear: 99% want it.

"Reversible propellers: 77% want reversible props.

"In the high-wing vs. low-wing category, 27% state a preference for a high wing, while 73% want a low wing. About 15% of the questionnaires returned stated no preference at all.

"A lavatory was requested by 98%.

"A galley was mentioned as a requirement by

FLIGHT OPERATIONS ROUND TABLE

Subject: *Specifications and Requirements for the Ideal Corporation Air Transport*

Place: *Blackstone Hotel, Chicago, Ill.*

55%. I might mention here that if an operator said he wanted a single-engine 4-to-6 passenger airplane, we considered his obvious lack of need for either a lavatory or a galley and did not include them in the above percentage.

"There is one item we did not include in this survey which I suggest we cover here today. That is the crosswind castering gear.

"That concludes the summary, except for some interesting comments that were noted in the 'Remarks' column on the questionnaire."

Mr. Speas: *"Maybe you could pick out some of the more interesting remarks and read them now. If there's time, we can come back to the rest of them later."*

Mr. Morrow: "Here are a few that stand out as I glance down the page:

" 'We want low maintenance costs, maximum degree of safety.'

" 'Preferably a low-cost four-engine airplane, ease of maintenance, heated, bird-proof windshield, a roomy cockpit, adequate fire protection, able to operate in 3,000-ft. fields.'

" 'Turboprops or powered by a small jet or 12-cylinder flat engines . . . like to see two types built: one about the size of the *Dove* with more powerful engines; the other about the size of the *Lodestar* with 300-mph cruising.'

" 'The ideal executive aircraft must be fast enough to better airline schedules, large enough to carry the best and most complete radio and navigation equipment . . . must be able to operate in and out of 2500 to 3,000 ft. safely and must have a ceiling above 20,000 ft., and an initial price of not more than $225,000.'

" 'As a smaller company, our requirements are modest. We'd like something along the lines of a de Havilland *Dove*, but of higher horsepower and speed, high wing, longer range, ease of maintenance, passenger cups, pressurization, etc. . . .

"Here's another note, 'We'd like a scaled-down version of the Convair 240 . . . more room in the pilot's compartment, adjustable seats, tricycle gear, all-metal, twin-engine, not over 1200 hp, eight comfortable seats, good lavatory facilities, full range, full gas capacity with full load of passengers.'

" 'A realistic approach must be made to the gross-weight problem. The manufacturer must take into consideration the fact that complete radio will be standard for corporation aircraft in the near future, and the aircraft must be capable of carrying all of its equipment with a full load of passengers and a full load of fuel without exceeding gross weight or center of gravity complications.'

"Another one wants '. . . dependable de-icing throughout, latest all-weather instrumentation . . . an airplane that can be operated in and out of 3,000-ft. airports with full gross weight . . . must be American built.'

"Incidentally, a few minutes ago, I mentioned that 99% were in favor of tricycle gear. Only one questionnaire stated a *(Continued on page 38)*

PARTICIPANTS *at the Round Table held at the Blackstone Hotel in Chicago included representatives of the Corporation Aircraft Owners Association, design engineers representing leading manufacturers, and several service operators*

TODAY'S BUSINESS PILOT *is a true company executive. Typical are Ted Pavelle (above left), Allied Stores; Bud Clark of Cluett-Peabody*

KUDNER MEN, *Pilot Bob Smith (below left), Copilot Art Schweit, are typical of corporate pilots who have added to success of operations*

THE BUSINESS PILOT

Today's business pilot is an executive, a meteorologist, a navigator, a steward and a salesman

by Eliot F. Tozer

Scratch a pilot of the business fleet and underneath you'll find the age-old wanderer of the earth who's at home anywhere. Scratch a little deeper and you'll find a hard core of business sense, one that has recently prompted this business pilot to take a hard look at his flight operation, with one eye to cutting costs and the other to stabilizing the entire executive aircraft industry. And this cutting of costs is proving to be a challenge —a challenge which the pilot's boss is helping him to meet.

Just what is a business or executive pilot? Generally, we could say he flies an airplane for a corporation. The plane might be a converted DC-3 or *Lodestar*, a Beech D18S or a de Havilland *Dove*. Strictly speaking, however, we would have to say that the business pilot is not only a pilot but also a traffic manager, meteorologist, navigator, steward, mechanic and, on certain occasions, a salesman of his company's product, and a confidant of its management executives.

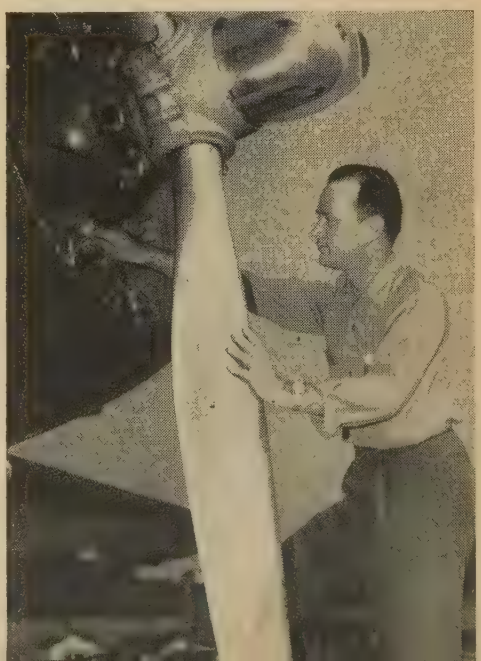
He usually finds himself flying 50 to 60 hours per month—in all kinds of weather—and getting from $700.00 to $1200.00 a month for it. Also important, he always finds himself enjoying a casual and pleasant relationship with his boss.

The executive pilot admits he's not in competition with the airlines. He's handling only executive passengers and their guests, yet—safety-wise—he wants to match the airlines and is sensitive about having to do it with "inadequate equipment: no tricycle gear, no independent brake systems, and no cargo oxygen bottles." On the other hand, he has latched onto the latest navigation aids—Zero Readers, A-12 Autopilots, and Omnirange—and has had them installed, posthaste and without ado, on his custom-built instrument panel.

Where did this latter-day picaro come from? Everywhere. And he can talk knowingly of everything from Jennys to jets. For in the complex pattern of his varying background, the only common thread is military service.

Take Ted Pavell, for example. He took his first ride as a nine-year-old in a 1921 Jenny from a field in Pocatello, Idaho. By 1932 he was flying actively, becoming an instructor during World War II at Lakeland, Florida. From there it was into the AAF as a first pilot on C-46's in the CBI. Back in the U.S. later, as a charter pilot, he caught the eye of (*Continued on page 54*)

CLUETT-PEABODY'S *copilot Bud Clark watches the economy of air operations as well as the all-important efficiency*



CORPORATE

flight base

Breaking records with its hard-working fleet of nine industrial airplanes, Magnolia Petroleum Company early last summer completed its renovation of a unique corporation flying headquarters in space leased from Southwest Airmotive at Love Field, Dallas. Simultaneously with the opening of its swank pilot-passenger lounge, offices, aircrew locker room, maintenance shop and airplane storage area in half of SAC's "Hangar 20," Magnolia announced that its pipeline patrol squadron of four Luscombes had just clicked off its first million miles and 10,000 hours of operation.

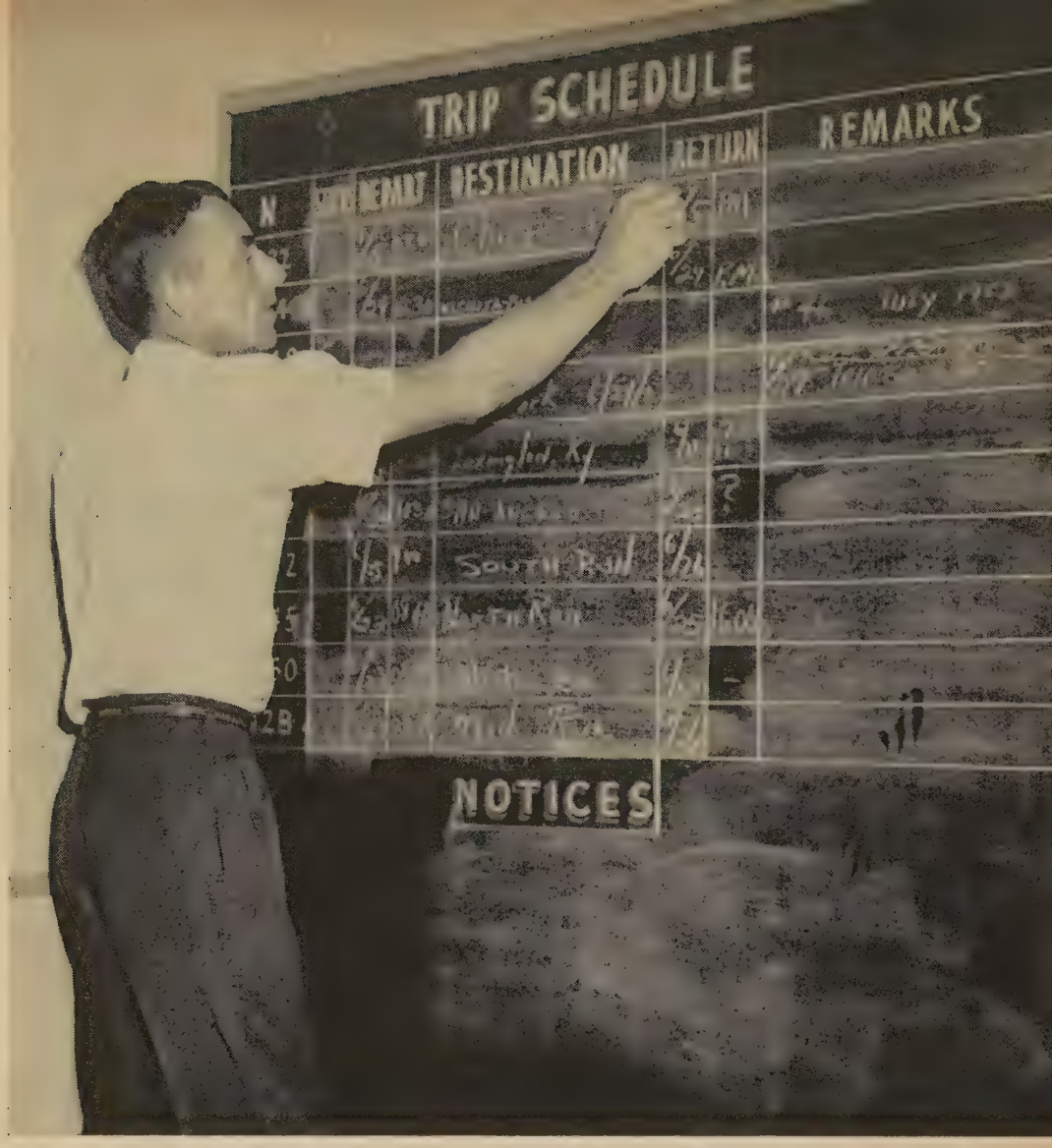
The million-mile mark was crossed in four years time. At the present patrol rate—7500 revenue pipeline miles per week between the trees and over the hills of Texas, Arkansas, Oklahoma, New Mexico and Louisiana—the second million will come up in little more than two-and-a-half years.

In addition to its hedgehopping "puddle-jumpers," Magnolia operates a deluxe DC-3 and a Twin-Beech for executive purposes, two "semi-executive" Cessna 195's and a Cessna 170 sales plane for use in calling on airport accounts, and expects delivery soon on a new twin-engine Aero *Commander.*

Technically, the four Luscombes are under the Magnolia Pipeline Company, while the others are under Magnolia Petroleum Company, the famous producing and refining affiliate of Socony Vacuum and the Southwestern marketer of Mobilgas and Mobiloil, with headquarters in Dallas.

The "Red Horse Air Force" is acknowledged by early visitors to be the first in that section of the country and probably would flutter-up streaks of envy in executive pilots in any corner of the land. Credit for its efficient layout, and for an aesthetic eye-appeal rare on any (*Continued on page 56*)

MAGNOLIA PETROLEUM CO. *now boasts a new pilot-passenger lounge at Southwest Airmotive, Dallas, Texas. A large map of the U.S. covers one end of the room. Here Pilot Dick Kee charts course for one of his weekly patrol trips*



PILOT PAPER WORK *used to be done using oil drums as desks. How times have changed is reflected here by luxury surrounding Pilot Kee (below) as he fills in flight forms*

TRIP SCHEDULE *is used to keep tabs on the movements of Magnolia's "air force" of 10 planes, 20 men. Chief Pilot Willis (above) marks up return date of trip to Chicago*

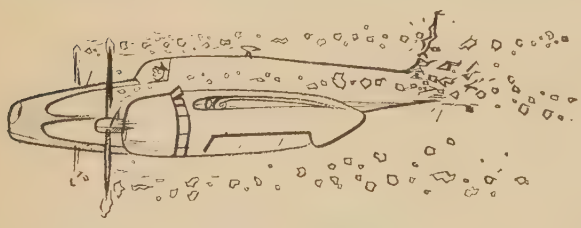
Performance

from the Files of the Flight Safety Foundation

ILS Approach

Check pilots have listed the following as frequent errors that occur on flight checks. Are you guilty of any of these?

1. Over-correcting, under-correcting or generally poor bracketing on localizer from inner marker to the field.
2. Poor control of airspeed from the outer marker to the field.
3. Varying rate of descent or altitude on approach.
4. Poor application of power to stay on glide path.

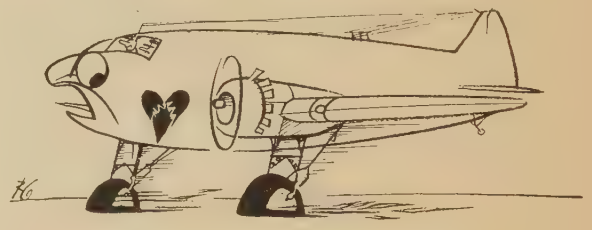


Ice is Solid

. . . and that's for sure! Winter brings many problems, not the least of which is icing. The icing in this particular case is that thrown off by propellers. Stabilizers have been struck and damaged by ice thrown by props. One way to overcome this danger of thrown ice is to turn on the propeller de-icers early in an effort to prevent large chunks of ice from hitting the leading edge of the stabilizer.

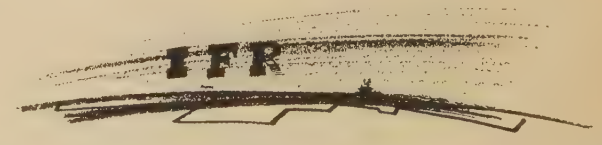
Braking

After making a landing at a metropolitan airport recently, an air transport blew a main gear tire. Investigation of the blow-out brought to light the fact that possibly many pilots are unintentionally putting pressure on the brake pedal and are not aware of it. Apparently without realizing it, a pilot exerts this unintentional pressure on the brake pedal due to the forward motion of his body in the seat when the propellers are reversed. To avoid inadvertent braking, the heel of the foot should rest on the floor and the ball of the foot on the rudder pedal in such a position as to permit quick and easy movement of the foot to the brake when braking is necessary.



Airport Managers

The airport manager can truthfully say that the prevention of mid-air collisions is not his operating responsibility. However, if such an accident should occur, Mister Airport Manager would be among the first to taste the wrath of public reaction. He should, therefore, take a hand in the prevention of mid-air collisions. Here are a few things the airport manager can do to keep things on the safe side in his congested area:

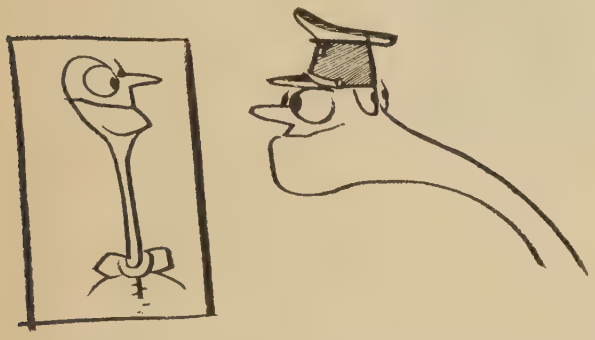


1. The airport manager should take steps to see that marginal weather (in which some aircraft fly VFR, others IFR) should be recognized as being equivalent to instrument weather and, therefore, subject to instrument flight control perhaps of a modified type within a definite radius from the airport. Marginal weather is difficult to define, but we all know it exists and we recognize it when we see it. It should not take a genius to work out a definition.
2. Cooperate with any program that encourages pilots to rubberneck. Safety material is avail-

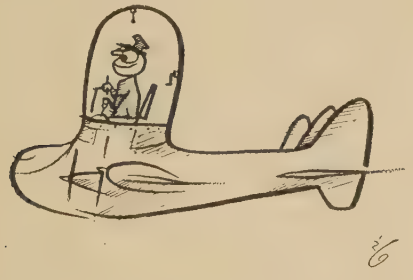
PITFALLS

by Jerome Lederer and Robert Osborn

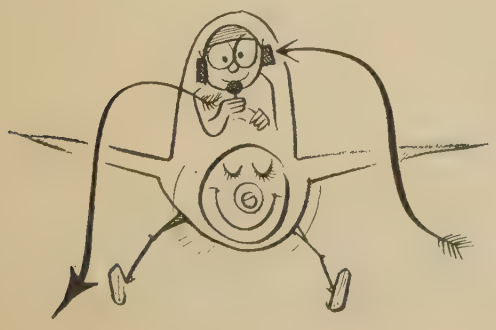
able for distribution among pilots and for bulletin boards—use it! This material can be posted in weather offices, on fuel pumps, on airport vehicles, and printed on every fuel receipt.

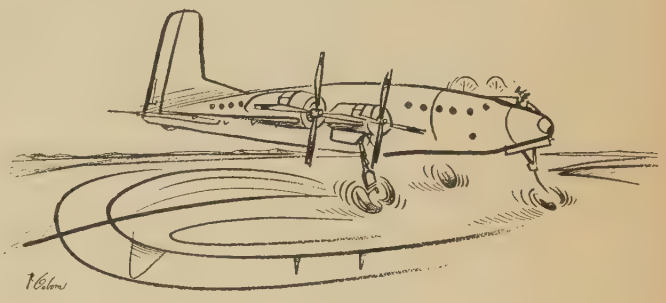


3. Encourage control towers to report near-misses; not for punitive purposes but to find out what happened and why.



4. Exert whatever influence you possess to get designers to provide better visibility from the cockpit, and operators to install high intensity anti-collision lights.
5. Require two-way radio in all aircraft using your airport.





Icy Runways

Pilots must use utmost caution when landing on an icy runway in a crosswind. Each situation should be carefully judged, and if there is any doubt at all, the pilot definitely should not try it.

Here's an example of what can happen:

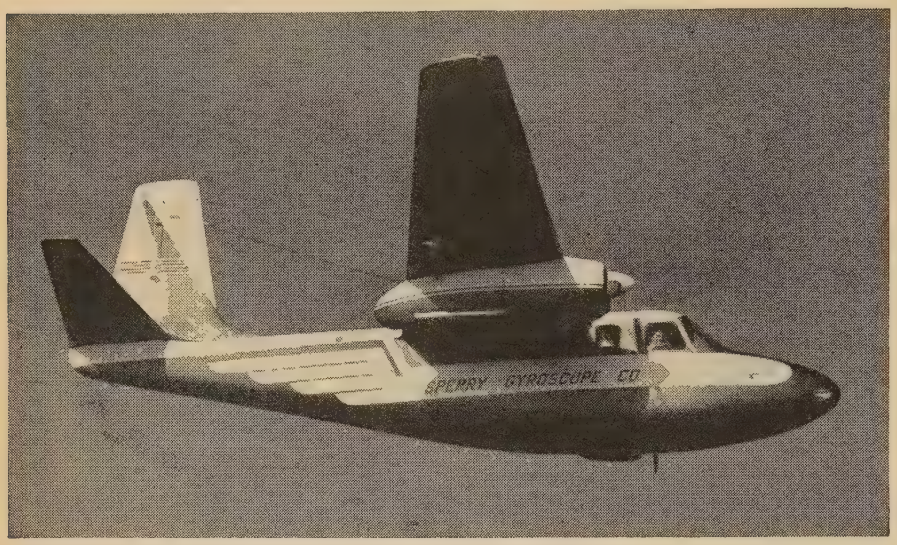
A pilot brought a tricycle-gear four-engine airplane in on an icy runway. During the initial roll, the airplane started to weathercock. Mild propeller reversing was applied to stop the tendency to weathercock, but when the airplane was straight on the runway, it began to skid downwind across the ice. The airplane finally ended up partially headed into the wind just off the edge of the landing strip. There wasn't any plane damage, but there could have been . . . and there were a lot of jangled nerves aboard.

A Captain's Responsibility

Train your First Officer well, but not too quickly. Help him over the rough spots and don't hesitate to take over when in doubt. No one wants to see a pilot, just getting started in the business, stub his toe. There's also the matter of airplane repair to think of . . . it comes high!

SKYWAYS FOR BUSINESS

NEWS NOTES FOR PILOTS, PLANE OWNERS OPERATING AIRCRAFT IN THE INTEREST OF BUSINESS



AERO COMMANDER *has been added to Sperry's executive-transport fleet. Commander is painted light grey with green trim and carries Lear radio equipment plus a Sperry Zero Reader*

Sperry Gyroscope Adds New Aero Commander to Executive Fleet

Great Neck, L. I., N. Y. The Sperry Gyroscope Company has taken delivery on a new twin-engine Aero *Commander*, light executive transport. The plane will serve as an executive transport for company officials and also will be used for testing new flight instruments and other flight equipment.

A high-performance twin, the *Commander* cruises at 197 mph at 10,000 feet, has a 1,750-fpm rate of climb and slow landing characteristics which make it possible to operate out of very small fields.

The Sperry *Commander* is painted a light grey with green trim, and carries Lear radio equipment. It eventually will carry a Zero Reader, C-2 Gyrosyn and other Sperry equipment. In the first few weeks of operation by Sperry, the *Commander* was flown a total of 100 hours in tracking tests for radar equipment developed by Sperry.

Sperry Opens Office in Miami

Great Neck, N. Y. Due to increasing activity in the Florida area, a sub-district office of Sperry Gyroscope Co. has been opened in Miami at 904 N. E. 2nd Avenue. Frank S. Mills heads the staff of field service engineers serving the users of Sperry marine and aeronautical equipment.

New Mercer County Airport, N.J. Opened to Commercial Aviation

Trenton, N. J. More often than not, news of airports has had to do with their closing and conversion to non-flying purposes, *e.g.* Roosevelt Field in New York, and Central Airport at Camden, N. J. Corporate pilots having to fly executives and company officials to the busy industrial area surrounding Trenton, will welcome the news that the new Mercer County Airport at Trenton, N. J. has been opened. This new airport adjoins the old Mercer Airport that was closed some time ago. The new field was built for the Navy during World War II. It has four paved runways 4,000 ft. in length with clear approaches and a land area of 500 acres.

Two existing hangars (of 64,000 sq. ft. each) will house aviation service organizations. This space has been leased to Spartan Aero Repair and Coastal Cargo, Inc. Bids are now being accepted for the construction of still another hangar to be approximately 50,000 sq. ft. in size.

Installation of a runway lighting system is expected to be completed soon, as is the installation of a low frequency marker.

Manager of the airport is Jack Stephan.

South Carolina Cuts Road Tax from Aviation Fuel

Greenville, S. C. South Carolina is making a bid for more of the aircraft refueling business by dropping its long-existing road tax from aviation gasoline. This was reported recently by S. C. Aeronautics Commissioner O. L. Andrews.

The 7¢ a gallon tax was dropped this summer, making the cost of aircraft gasoline in South Carolina the lowest of any state in the nation.

New Hertz Driv-Ur-Self Station Opened at Cincinnati Airport

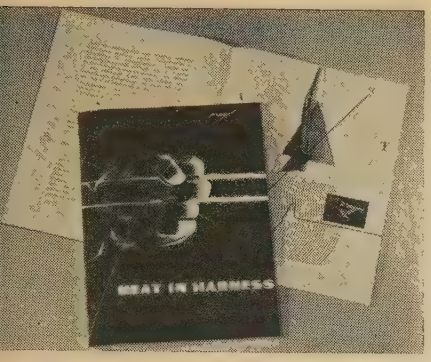
Cincinnati, Ohio. Corporate pilots and their passengers wanting the convenience of a private car for use while in Cincinnati will welcome the news of the opening of a Hertz Driv-Ur-Self Station at the Cincinnati Airport. The airport station was designed to simplify operation of the plane-auto travel plan in the Cincy area. Upon advanced reservation, the executive pilot or passenger now can step into a waiting car immediately upon leaving his plane.

Location of the Hertz Station is in the center of the waiting room of the airport. The parking space for the Hertz cars is adjacent to the airport's baggage counters.

Before opening the new Hertz operation, the airport's car rental service was on a limited basis. There are now twice as many plane-auto travelers in the Cincinnati area as

PIPER TWIN-STINSON, *twin-engine light transport, is shown here in single-engine test at 9,000 ft. Noticeable modification since plane first flew earlier this year is single fin and rudder. Twin-Stinson's engines are 150-hp Lycomings. Production plans call for deliveries mid-1953*

here were. The operation at this airport is ne of 556 Hertz System locations in the J. S., Canada, Great Britain, Hawaii, Alaska, Iexico and Switzerland.



IEAT IN HARNESS *booklet tells story of combustion engineering development over the years*

"Heat in Harness" Booklet Offered

Columbus, Ohio. A new booklet, "Heat in Harness," has been put out by the Surface Combustion Corporation. This interesting booklet tells the story of combustion engineering development over the years and details the experience, research and thinking behind Janitrol aircraft heating equipment. Free copies of this booklet can be had by writing Surface Combustion Corporation, Dept. 1000, 400 Dublin Ave., Columbus 16, Ohio.

REPAIR KIT *for re-sealing fuel tanks has been marketed by the 3M Co. The kit meets all Specs*

Repair Kit for Re-Sealing Fuel Tanks Brought Out by 3M Co.

Detroit, Mich. A repair kit for re-sealing airplane integral fuel tanks has been made available by the Adhesive and Coatings Division of Minnesota Mining and Manufacturing Co. The kit consists of 175 grams of sealant in an 8-oz. jar and a smaller jar of accelerator material, both packed in a single container, 11 kits to a carton. Each carton contains a multiple-duty hand tool for mixing the accelerator and sealant, cleaning the old sealant from the repair area, and applying the new sealant, plus a jar of fuel barrier overcoat that should be applied over the sealant's surface and allowed to dry. Each kit contains enough sealant to do a number of separate spot repairs. The kit meets Specification MIL-S-7502 (superseding AF Spec. 4153) and Air Force Tech Order OI-1-3. Further technical data is available on request from the 3M Company, 411 Piquette Ave., Detroit 2, Mich.

. . . in the Corporate Hanger

Al Junkers and Arnold Hayes, chief pilot and mechanic, brought Bethlehem Steel's *Lodestar* to Pacific Airmotive for a complete radio installation and other work.

Ideal Cement Company's DC-3 now boasts Pratt & Whitney 1830-94 engines instead of the P&W 1830-92 engines. Conversion work was done by Butler Company's Washington division and the job was done in a little over two weeks. Chief Pilot for Ideal is Forest R. Conover, and the company belongs to the Corporation Aircraft Owners Association.

Coca-Cola Company is now flying its newly converted DC-3 with Pratt & Whitney 1830-75 engines. Conversion work was done by Beldex Corporation, an affiliate of Remmert-Werner, and the plane is equipped with a Sperry A-12 Autopilot, C-2 Gyrosyn compass, Collins 17L transmitter, three 51R receivers, with dual Omni and RMI, dual 51V1 glide slopes, ARC F-11 Isolation Amplifier in addition to the usual ADF's, Marker, etc. Coca-Cola's pilot is Ralph Whitworth, formerly with Falstaff Brewing Corp., and copilot is Dick Young, formerly with Gaylord Container Corp. The DC-3 is based at Atlanta, Georgia. Maintenance work will be done by Remmert-Werner.

Filmdom's star Robert Taylor had his Twin Beech at Spartan Aero Repair for a double engine overhaul. Ralph Causer brought the airplane in while Taylor was on location for his latest picture for MGM.

Earl Hartman and Paul McCabe, Goodyear Tire & Rubber Company pilots, have their company Twin Beech back in operation after new radio installation and overhaul at AiResearch.

Union Oil's executive DC-3 is at Pacific Airmotive for 1,000-hour inspection, engine change and other work. Pilot Charles Wheeler and Copilot Charles Keegan brought the company Douglas to PAC.

Carl Christensen, formerly with Monsanto Chemical Company, is now flying a Remmert-Werner converted DC-3 for Paul Mellon and Alan M. Scaife of Pittsburgh. The plane is equipped with P&W 1830-75 engines, Collins 17L transmitter, three 51R receivers, with dual Omni and dual RMI, dual 51V Glide Slope, 18S4 MHF transceiver, Sperry A-12 and C-2, ARC Isolation Amplifier, dual ADF, etc.

Tommy Rafael, pilot for Cantlay & Tanzola, has his company's Twin Beech back in the air after 100-hour inspection, prop overhaul.

Carter Oil Company had both its DC-3 and *Dove* at Spartan Aero Repair for thorough check-ups.

Bob Gragg, Chief Pilot for Reynolds Metals, has his company's executive DC-3 back in operation after 100-hour inspection at Butler Company, Washington, D. C.

The Texas Company's Convair 340 is in operation after installation of an executive interior. Its pilots are Don Baldwin and Johnnie Franz. Work on the Convair 340 was done by AiResearch at Los Angeles.

Dick Smith, pilot and CAOA representative for Champion Paper & Fibre Co., had his company's PV-1 and newly acquired Twin Beech at Spartan Aero Repair for major work. The PV-1 was in for 1500-hour inspection, new upholstery, additional radio equipment, larger oil tanks and a new coat of paint. The Twin Beech took on a coat of grey, green and white paint with bronze trim; right engine was overhauled, and double windows were installed in the cabin. Both planes are based at Lunken Airport, Cincinnati.

Dave Thayer and Bucky Bryant, pilot and copilot of Fullerton Oil Company's de Havilland *Dove*, brought the plane to Pacific Airmotive for top engine overhaul. The *Dove* is back flying again.

CAOA report

CORPORATION AIRCRAFT OWNERS ASSOCIATION, INC.

Corporation Aircraft Owners Association is a non-profit organization designed to promote the aviation interests of the members firms, to protect those interests from discriminating legislation by Federal, State or Municipal agencies, to enable corporation aircraft owners to be represented as a united front in all matters where organized action is necessary to bring about improvements in aircraft equipment and service, and to further the cause of safety and economy of operation. CAOA headquarters are located at 1029 Vermont Ave., N. W. Washington 5, D.C. Phone: National 0804.

Fifth Annual Meeting

The Fifth Annual Meeting of the Corporation Aircraft Owners Association was held at the Blackstone Hotel on October 2, with Cole H. Morrow, Chief Plant Engineer of the J. I. Case Co., serving as Chairman.

Chairman Morrow summarized the varied activities of the Association during the past year, stressing its many achievements, and he outlined some of the major objectives for 1953. He pointed out that the membership had increased over 50% since the last Annual Meeting and that every effort would be made to double the membership by the time of the 1953 Annual Meeting.

Acclaimed the most successful Annual Meeting since the inception of the Association in 1947, the large group of members in attendance, representing 71 various industries, pledged strong support to the accomplishment of the 1953 program of CAOA. A new membership drive was urged to further boost the fast-growing roster of large and small corporations and businesses that are presently represented by the Association.

Vacancies Filled

Three vacancies on the Board of Directors were filled by the election of the following:

Ralph E. Piper, Monsanto Chemical Co., St. Louis, Mo.

E. T. Spetnagel, Wolfe Industries, Columbus, Ohio.

Anthony Zuma, Tennessee Gas Transmission Co., Houston, Texas.

Howard L. Maurhoff, National Dairy Products Co., New York, was re-elected Treasurer.

At the Directors' meeting shortly after the Annual Meeting, Mr. Morrow was re-elected Chairman of the Board for the succeeding year.

Pilot Availability

Maxwell W. Balfour, Vice President, Spartan Aircraft Co., and Vice President of Aeronautical Training Society, was the first speaker during the morning session of the Meeting. Mr. Balfour pointed out, in part:

"We have been most successful in training the men who maintain your airplanes, but as a school, our real success hinges largely on the success of those who are so hard to define, so hard to choose, so hard to evaluate, that unknown individual, that intangible, the pilot. Nowadays, it seems that our armed forces and others are attempting to put the calipers on this man. They have the Stanine process which will tell you whether he's a good bus driver and, consequently, a good pilot, or whether he's a good business man and, consequently, a good manager for the aviation division, or whether he's a good technician . . . or whether he's no good.

"It seems that we ought to know in advance, or at least at the time we hire a man, whether he's a pilot or a statistic. I don't know of any brief description that will cover the executive pilot. He has to be completely devoted to his purpose. He must have a disciplined moral courage. He must be a diplomat, and when he isn't too busy trying to do some of his other duties, such as satisfying the purchasing department, trying to get more equipment, studying the weather, supervising maintenance, figuring out what's the matter with his radio, checking overhaul invoices, and emptying ash trays, he has to go out and do a very creditable job of flying from here to there safely. The strange part of it is that with our miscellaneous method of procuring executive pilots and the queer way they've been treated, they are flying efficiently and safely. The fact that we've had that miracle, however, doesn't mean it will continue forever. We ought to examine the pilot sources we've had to see whether they're still good, and then find out if we can do anything about continuing those sources or finding new ones.

"I would say that the first thing to do to attract good men is to make it possible for them to get a job. If they are suited, let them get on the Corporation Aircraft Owners Association's list of availables, and let those who want pilots look to that list for men who can be recommended.

"The next angle is security. What security does a corporation offer its pilots or the manager of the aviation division? I know there are plenty of cases where the pilot has worked himself out of his pilot's job into something better. There have been many cases where the corporation executive has seen the qualities in his pilot and, when he could no longer fly the airplane, has taken him into sales or some other division of the company.

"In getting down to the real meat of the subject though, what is the situation now? What is the supply and where is it? There are quite a few good pilots available, but many of them do not seem to meet the specifications. And whatever is available is going to soon be exhausted. If we are mindful of the future of corporation flying, we must do something about it. The first thing to decide is what we want in an executive pilot. He should be reasonably intelligent. We want men who are intelligent enough to cope with technical and management situation."

Corporate Role in War Emergency

In his talk before members of the CAOA, Brigadier General Ray W. Ireland, Administrator of the Defense Air Transportation Administration, U. S. Dept. of Commerce, frankly outlined some of the problems facing the Government. Gen. Ireland commented, in part:

"The question of what will happen to corporation aircraft or what function will be performed by corporation aircraft in event of a war emergency is, of course, only one phase of the question of what happens to civil aviation in general in a war emergency. The job of DATA is to plan and direct mobilization of civil aviation resources and facilities. As we interpret that, it includes all civil aviation resources and facilities; all types of aircraft, all operators of aircraft.

"We need a plan. If we don't have a plan and a full-scale war should break out, most anything can happen. We had a good illustration of that in World War II with the airlines. They just barely escaped being taken over completely by the military and operated by the military for the duration of the war. We don't want that to happen to the airlines again. Nor do we want that to happen to corporation aircraft, or any other phase of civil aviation, provided that particular segment of civil aviation can perform its defense job better if it operates its own aircraft with its own people, and adequately takes care of the defense requirements handed it by proper authority. In all the thinking at DATA, we're proceeding on the basis that the best job can be done by the people who are now operating the aircraft.

"What is it that civil aviation, including corporation aircraft, will be called on to do if we get into a major war?

"Frankly, I didn't know until recently that there were so many multi-engine aircraft in the hands of corporations in this country. In general, there are something like 1700 or more multi-engine aircraft available through corporations. Many of them are DC-3's. That represents a substantial reserve of airlift which could supplement, as I see it, the general air transportation picture in this country in time of war. . . .

". . . I think that the privately owned aircraft problem divides itself into two phases: first, the type of aircraft we are talking about now, the multi-engine or twin-engine airplane which would perform a real transportation job. Secondly, there are the thousands of smaller aircraft which couldn't perform as important a role in transportation but which could perform many other useful functions. Plans for the utilization of all of the aircraft by civil defense have been worked out in the various states. Those aircraft would be called into service to the extent needed and could be used for many purposes, outside of the general transportation picture.

"To get back to the multi-engine planes which could fit into the general transportation picture, it seems to me that we should

roceed on the basis, first, that not only is desirable that those aircraft be operated the maximum extent possible by the present owners but that it may be necessary due a shortage of flying personnel. . . .

"In a civil defense emergency, we have a lan under which these aircraft would all e controlled from one central point in Washington. The plan is that through the airlines e would set up areas to which private aircraft, particularly your type, would report in ne event of an emergency. The airlines ould collect information as to the availabily of these aircraft, their location, and transit that information to the central point in Vashington. The Civil Defense organization ould direct the use of these aircraft to the est advantage in handling the national emerency. This plan, by the way, has yet to be nally approved by the Civil Defense people.

"I wish I could tell you that there is no uestion but that all of your aircraft would e operated by you under such circumtances. I'm sure you realize as well as I o that your aircraft probably could be operted only if they were engaged in an essenial defense service. Otherwise, you probably ouldn't get gasoline or spare parts. I would hink that to a very large extent the funcions which you are now performing for your orporations would constitute defense funcions. Perhaps to that extent your airplanes ould remain exactly where they are under he same control, under the same operation nd performing about the same type of servce they are now performing. In cases where his would not be true, I can see that you ould well supplement the airline transportaion picture."

uncheon

At the close of the morning session, Assoiation members and guests gathered for a re-luncheon get-together. Among the promnent luncheon guests were: T. Hamilton Reidy and C. W. Moore of Helicopter Air Service, Inc., Wiley Wright of the CAA, Gene Sutton and James J. Mitchell of Aero Associates, Inc., Herbert J. Pyle of Bendix Aviation, Don Reed of Barber-Colman Corp., Ford E. Slagle of Executive Airmotive, Art Hoffman of Gopher Aviation, Inc., Joe Hargrove of Lockheed Aircraft Service, E. T. Williams of North American Aviation, B. J. Sproch of Northside Chevrolet, Inc., L. B. Littrell of Pacific Airmotive, E. Jack Hoyt of The Purdy Co., John F. Haussler, Jr., of Qualitron, Inc., John P. Henebry of Skymotive, Inc., S. D. Murphy of Thompson Industries, Bennett H. Horchler and D. N. Ahnstrom of SKYWAYS, and Robert H. Wills of the Milwaukee *Journal*.

Guests as well as members present represented all sections of the nation and a variety of industries and businesses.

CAB Views Corporate Flying

Following luncheon, the Hon. Donald W. Nyrop, Chairman of the CAB, pointed out he rapid increase in corporation flying in his talk on "The CAB Views Corporation Flying":

"Since the end of the war, I have watched with keen interest the increasing use of civil private aircraft by American business corporations. Although this development of company interest in private air transportation is a logical combination of commercial airline usage and civil private flying, it is, nevertheless, a unique development confined almost entirely to the United States. Indeed, this typically American development of utilizing the airplane as a means of increasing the efficiency and profits of private business is a tribute to our capitalistic system of free enterprise.

"Prior to World War II, there was only a small amount of so-called 'business flying' conducted by corporations owning and operating their own airplanes. Most of these generally charged aircraft operation off to advertising or publicity, and only in rare instances recognized their company airplane as a conventional but faster method of travel.

"By the end of the war, however, the airplane as a vehicle of transportation had caught the attention of American business. There were many factors that caused this recognition to come about. Certain of these major factors were the wartime world-wide operations of the Air Force Air Transport Command and the Naval Air Transport Service, the wartime job performed by our commercial air carriers, and the sudden flood of surplus military transport pilots that became available in 1946 and 1947. As a result of these factors, segments of American private business adopted the aircraft as a vehicle of company transportation rather than company publicity.

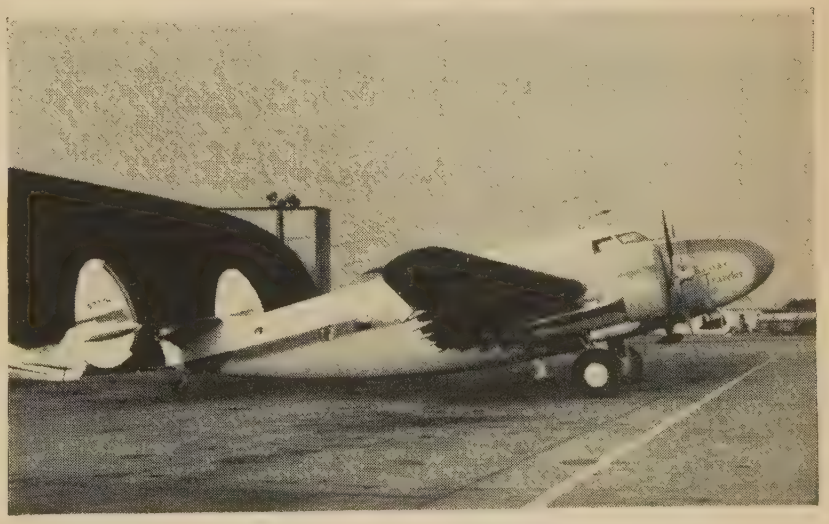
"When corporations first began to purchase multi-engine air transports for company use, there was some speculation as to whether the companies' sudden interest in transport flying was not based on tax reductions made possible through such ownership. There was also a fear that corporation transport operations would hurt the passenger business of our domestic airlines. While it is doubtlessly true that favorable tax provisions have stimulated this aircraft operations program, it must be stated as a definite fact that the very ownership of a transport airplane inevitably created a desire to use it. The extensive use of the company airplane today should remove all doubt in anyone's mind that it has earned its place in company transportation.

"The second criticism concerning the fear that private company airplanes would siphon off business from regular airline operation has been proven false. In this connection, a survey conducted by your own organization disclosed that after corporations purchased their own airplanes, scheduled airline travel by employees of the individual companies owning the airplanes generally increased from 300% to 800% in the amount of money spent for airline tickets. Another interesting fact disclosed by this CAOA survey showed that of your company personnel using commercial air transportation for the first time, more than 85% had received their first ride in the company airplane. It is safe to say, therefore, that top executives, as a result of using company transport aircraft, are convinced that the most efficient way to attain maximum use of an employee is to cut down the time he may be required to spend in traveling. Hence, many top officials made it a requirement for their employees to fly commercially in the conduct of the company's operations.

"I must admit that the size of the fleet of corporation-owned airplanes and the money invested in this fleet is truly an amazing testimony to the resourcefulness and vision of American business and to the system of free enterprise under which it operates. The current size of the air-transport fleet owned by American corporations numbers about 10,000 aircraft, of which more than 1700 are multi-engine airplanes. The corporation investment in this fleet is now close to 200 million dollars, plus a total corporation expenditure or more than 100 million dollars per year for operations.

"The make-up of this fleet of some 1700 multi-engine corporation-owned aircraft is equally amazing. The larger multi-engine category includes 265 Douglas DC-3's, 210 Lockheed *Lodesters*, 45 Grumann *Mallards*, 4 Convairs and 2 DC-4's. The smaller multi-engine category leads off with 625 Twin Beech's and 140 Grumann *Widgeons*. In addition, corporations own and operate numerous transport conversions of such military aircraft as: 15 B-23's, 15 Lockheed *Venturas*, 25 B-25's, 25 B-26's, 3 B-17's and 4 B-24's. . .

"The operation of executive aircraft is subject to less Federal regulation than any other operation using similar transport equipment. The Government has deliberately kept its



CAOA MEMBER, *L. B. Smith, Inc., owns and operates this executive Lodestar. Conversion work was done by Aerodex Inc., Miami. The plane seats 10 plus pilot and copilot*

regulatory activity to a minimum. With the respect to the general rules of the road (air traffic control), all flights are governed by the same rules. However, with respect to pilot certification and so far as Government regulations are concerned, a private pilot could, under certain circumstances, serve as the pilot of an executive aircraft. I realize, of course, that the conditions generally imposed by the business concerns operating executive aircraft call for higher qualifications, usually ATR ratings, and your companies are to be commended for imposing this higher standard. The Government has not imposed any requirement for training programs or for systematic review by the Government of pilot proficiency other than such general checks as are made of all pilots engaged in private flying.

"Similarly, with respect to maintenance there is no governmentally prescribed program for corporation aircraft and every effort is made to leave as much of the responsibility as is possible with the operators of the aircraft. For instance, as many of you know, aircraft which are used in commercial airline operations are required to be maintained 'according to the book' which takes the form of a maintenance manual subject to approval by the Administrator of Civil Aeronautics. However, and by contrast, the Federal regulations governing your operations are no more severe than those applicable to the private pilot operating a Piper *Cub* around his local airport. For example, your aircraft are required by Federal regulations to undergo an annual airworthiness inspection and an aircraft operated for hire must, in addition, undergo a periodic inspection every 100 hours of flight time.

"So you see the Government has refrained from stepping in with burdensome and unnecessary regulatory requirements to govern your operation. Personally, I desire to see this policy continued. However, in view of the size of your operation, the number and type of aircraft, the fact that you operate under instrument conditions and under all the varying conditions met by the commercial airlines, it is apparent that in order to continue your freedom from Federal regulations, it is necessary for you to use every means at your disposal to preserve the excellent safety record of your operations."

Airline View

Harold Crary, Vice President of Sales for United Airlines, opened the afternoon session of the CAOA Annual Meeting with a talk on "An Airline View of Corporation Flying." He said,

"Each time there has been a new form of transportation developed, our national life has been stimulated and our social, industrial, economic, and distribution habits altered.

"On the subject of how airlines view corporation flying, it is pertinent to say that the Corporation Aircraft Owners Association constitutes an important segment of aviation. The airlines have determined that you are a potent force in advancing aviation. We also know that a corporation plane is a great sales tool for the airlines. A study of our Air Travel Plan accounts reveals that often after a corporation buys its own airplane the amount of business which they do on the scheduled airlines increases, showing corporate flying has created new passengers and new interests in air travel.

"The airlines also recognize that many men in industry who have never flown get their introduction in the corporation airplane, and I have seen some estimates that this figure runs as high as 75%. Once executives have taken their first airplane trip, they recognize the speed, comfort and interest of air travel, and for their regular travel become patrons of the scheduled airlines.

"We also recognize that there are many airports in the U.S. which are of a type not served by the regular scheduled airlines and, furthermore, that to certain smaller cities the frequency of schedules does not always jibe with the special situations which arise and prompt the use of a corporation airplane.

"United Air Lines has given full recognition to the importance of corporation aircraft owners by making available a courtesy card which entitles the holder to make United Air Lines its stop-over headquarters. United Air Lines station managers also are ready to be of service in any way possible . . . dispatch and weather information, helping in auto rental, hangar storage where available, telephone and telegraph and, in general being helpful to the pilots of corporation aircraft. We do this as a public relations move and in recognition of the importance of those who own and ride in corporation aircraft in a general advancement of flying, including development of commercial aviation."

ATTN: CORPORATE PILOTS

The St. Louis area corporation pilots in conjunction with their local CAA Aviation Safety Office are holding a Safety Discussion Meeting, Monday, December 8, 1952, at the B.O.Q. of the St. Louis Naval Air Sta., Lambert Field.

'Copter for Corporation Use

Harvey Gaylord, Vice President of Bell Aircraft Co., and Chairman of the Helicopter Council of the AIA, gave a very interesting talk of the future of the helicopter for corporation use. Mr. Gaylord supplemented his talk with an interesting color film showing the varied uses of the helicopter. Said Mr. Gaylord,

"Since World War II the Corporation Aircraft Owners Association has expanded greatly and has made many important contributions to the operation of aircraft and to the technical development of transportation. Your membership represents a substantial cross-section of typical American enterprise, including engineering, construction, chemical products, farm machinery, manufacturing, publishing and many others. Present helicopter operations offer an interesting parallel. Commercial helicopter deliveries over the past six years are approaching the 500 mark. A sizable percentage of these helicopters are being utilized approximately 500 hours per year by corporations engaged in generally the same fields of industry as represented by your membership. . . .

"Going beyond the incorporation of helicopters into a corporation's aircraft division, from the training and maintenance standpoint, the important question is specifically, 'What can the helicopter do effectively in corporation work?'

"The helicopter enjoys material advantages in short-haul transportation between plants and metropolitan areas on a point-to-point basis. For example, the Rockwell Manufacturing Company of Pittsburgh, Pa., produces a wide variety of specialized products. They believe the helicopter to be a solution to the problem of quickly transporting company personnel and parts from plant to plant in the Pennsylvania and Ohio area. The Rockwell Company has ordered an S-55 for these short-haul flights and scheduled operations are contemplated in and out of the Pittsburgh factory. According to Mr. W. F. Rockwell, the helicopter can leave its 100-ft square landing site at the Pittsburgh plant and arrive at the firm's DuBois plant in the time required to reach the local airport by ground transportation. The Rockwell Company has many other plants situated at greater distances and for these, of course, a conventional airplane is used and this is based at Alleghany County Airport.

"Small heliports can be easily arranged within most plant property. Either a small area on the lawn of the administration building, a parking lot or a roof top can make an ideal heliport.

"With the helicopter well established in its particular field, what then is being done to provide the versatility and advantages of the helicopter with the speed and range superiority of the fixed-wing airplane? The helicopter industry is already undertaking the development of convertiplanes. The convertiplane performs as a helicopter during take-off, landing, and in the low-speed flight ranges and as an airplane in the higher speed ranges. After vertical take-off and forward acceleration as a helicopter, the convertiplane becomes an airplane offering relatively high cruising speeds and long range."

Aero-Medical Problems

A most instructive talk on "Medicine and Transportation by Air" was delivered by Dr. F. L. Flack, Chief Surgeon of the Sinclair Companies. He reported, in part:

"Aviation medicine is that branch of medicine which deals with the health of the personnel engaged in flying aircraft and with the health and well being of the passengers. . . .

"The physical examination must be conducted with particular care to determine the presence of physical defects that would prevent the full efficiency of the aviator at altitude. This includes special consideration of the heart, lungs, eyes, ears, sinuses and central nervous system. The psychiatric examination is aimed to exclude the unsafe flyer and unstable personalities.

"The stresses that are of particular importance and are encountered during flights are reduction in oxygen and lowered atmospheric pressure. This brings up the question of anoxemia. The term anoxemia signifies a lack of oxygen in the blood. Anoxemia is the most serious of deficiency diseases and is the one disease with which aviation is most concerned.

"The brain and spinal cord are very sensitive to oxygen lack and this oxygen lack causes disturbances of the conscious state, the thinking power and judgment, and muscular coordination. An oxygen lack produces blueness and an increase of blood pressure and pulse rate. People that become blue on flying should be carefully evaluated before going above 5,000 or 6,000 ft.

"The treatment of anoxemia is to supply oxygen with the proper mask, and I feel the best mask is the B.L.B. In some cases

oxygen may need to be given under pressure. Pilots flying above 10,000 ft. should use oxygen to keep their mental, nervous and muscular systems in the best condition.

In persons whose ability to use oxygen is reduced by lung and heart changes, the effects of oxygen lack become apparent at much lower altitudes and the consequences may be more serious. Older people who have organic heart disease or changes in the lungs or who become blue at 8,000 or 10,000 ft. should fly below pressurized cabin altitudes which are about 8,000 ft. Oxygen lack dilates the heart and heart irregularities tend to be permanent. That is the reason I have recommended that people with severe heart irregularities should not fly where altitudes above 6,000 ft. may be reached.

"Pilots, copilots and passengers should not begin a flight on an empty stomach. Light foods which are easily digested should be eaten before departure.

"The use of vitamins, especially A, C and the members of the B group, are of value in maintaining a high degree of fitness. In night flying it is evident that deficiencies of Vitamin A should be guarded against. Flying personnel should have adequate amounts of Vitamin C because C is depleted by exposure to decreased oxygen. One of the finest and most certain supplies of Vitamin C is orange juice.

"Other threats to the health of the aviator include noise, vibration, air embolism, motion sickness, acute oxygen lack and the effects of acceleration such as brown out and black out. Black out is a temporary loss of vision."

Air Navigation Aids

The final talk of the Forum was given by Donald M. Stuart, Director, TDEC, CAA. Speaking on new developments in air navigation aids for corporate aircraft, Mr. Stuart said,

"I'm going to talk today about a method of navigation which is made possible by the Omni Bearing Distance System. I know you all are familiar with the Omnirange component of this system, so I will, therefore, concentrate on its companionpiece, the distance measuring equipment which completes the system, and the types of airborne instrumentation which may be used to display the navigational information derived from the system.

"The pressing problem today is that of maintaining an orderly flow of traffic with a minimum of delay and in sufficient volume to meet our transportation needs.

"The navigation system should be so conceived and designed as to constitute a tool for the control of air traffic and, ideally, should in no way impose any limitations on the flow of traffic. The objective should be to provide a system on which the only limitation is the capacity of the airport itself. The navigation aids I am going to describe will, I believe, with some further development and refinement provide the answer to many of today's problems.

"The CAA program for the establishment of distance measuring equipment is going forward as fast as the equipment can be installed. The CAA has contracted for 453 equipments, which is sufficient to equip all of the Omnirange stations and the instrument landing glide path locations as well. Perhaps a hundred of these equipments already have been delivered and the balance are coming to us at the rate of 10 per week. The program should be completed within about a year. Airborne equipment recently has been delivered in small quantities and there's indication that it will be commercially available very shortly. It probably would be commercially available now if the manufacturer had assurance of a sufficient market to justify setting up production-line methods of manufacture.

TYPICAL CORPORATE *plane, converted from the military, is this B-23 owned and operated by a steel company. There are 15 B-23's operated as executive aircraft in the U.S.*

"Under sponsorship of the Air Navigation Development Board, we have contracted for the development of two different versions of the airborne DME equipment. One of them is the unit that was made essentially to provide simplicity, low cost and light weight, at somewhat of a sacrifice to accuracy—although we believe the accuracy is probably adequate to the initial task the equipment will have to perform. The Hazeltine Company, in connection with their development of this low-cost unit, also developed a more elaborate piece of equipment which should be commercially available soon. National Aeronautical Corporation of Ambler, Pa., also has had a contract with us for the development of DME airborne equipment. While that company is well along with this project, we haven't had any deliveries as yet. We expect their equipment soon.

"With both the Omni and DME installed, all the elements are available for an extremely flexible method of navigation. Having both azimuth and distance information in the airplane, it becomes possible to fly on any arbitrarily selected track within the coverage of the radio facilities. Our first efforts in this direction were directed toward providing arbitrary track guidance with the navigational information displayed on the standard crosspointer meter which we use for straight Omni navigation and the instrument landing. With the type of device designed to accomplish this, it is necessary to make some settings on dials in this equipment. It is necessary to set in the distance of that point from the Omni Bearing Distance facility. We have to set in an azimuth and we have to set in the course that we desire to fly to that point.

"I know there is one other thing of interest to everyone here that's concerned with problems of traffic control and navigation, and that's the status of the airborne radar transfinder beacon. With the advent of radar traffic control, it soon became clear that failures of the radar would occur during heavy rainfall and under other conditions of adversity. One of the difficulties which is with us all the time is our inability to determine the identity of the aircraft that are under radar surveillance. As things stand now, it is necessary, in case an identity is unknown, to ask the airplane to fly a certain pattern, make a turn or perform some maneuver which would identify it as the one under surveillance and with which communication is being held.

"We are currently evaluating a radar transfinder beacon which receives interrogations from the radar and sends back the reinforced reply at a different frequency so the reply can be displayed on a separate scope which is free from any targets other than aircraft equipped with this type of Reese Finder beacon. It will work with either the surveillance radar or with precision approach radar. There are a number of problems associated with the radar transfinder beacon which remain to be solved; some of them are quite serious, so I don't expect equipment of this kind is going to be available in the near future. I think that probably several years will elapse before we will have equipment suitable for this job."

Resolution Adopted

Henry W. Boggess of the Sinclair Oil Co. offered a resolution to the members attending the CAOA meeting in Chicago. The resolution was greeted with cheers and applause, and unanimously adopted by a rising vote:

"RESOLVED, that the members of CAOA gratefully acknowledge and sincerely express their warmest appreciation to Cole H. Morrow, Chairman of the Board of Directors of CAOA, for his loyalty, enthusiasm and selfless devotion to the task of developing and advancing the cause of corporation flying; that his crusading efforts on behalf of CAOA have greatly contributed to a better understanding of the aims, objectives and requirements of corporate aircraft owners and operators; that his staunch defense of the rights and privileges of corporation flying has aided its unrestricted growth, awakened the federal government and the aviation industry to its vast potentialities, and won due recognition for its accomplishments; that his friendliness, courtesy and humor have continued to build good will for CAOA and to encourage the members to strive for new members to strengthen the national voice of the Association."

Skyways Round Table

(*Continued from page 25*)

preference for conventional gear, and the reason given was, '. . . because of the ease of passenger and baggage loading and because the lower height makes it easier to put the baggage in the baggage compartment. Passengers can thus be required to carry their own bags on and off the airplane.'

"Still another questionnaire asked for, '. . . supercharged engines, pressurization for all-weather on-top operations. Primarily want speed and comfort, bird-proof windshields, 65-mph landing speed, 300-mph cruising, 12 passengers, and pressurized to operate efficiently at 30,000 ft., good single-engine performance.'

"I think that just about covers it, Dick."

Mr. Speas: *"Thank you very much, Cole. That gives us a good start. Now, to go down the list of operators who are here and who have their own thoughts on this matter of requirements, I'd like to call first on Capt. Van Liew."*

Capt. Harry R. Van Liew *(Capt. UAL; Pres. Air Transport Co.):* "Speaking from my limited experience, in this particular phase of the work we are up against a problem. Like a woman trying to buy a hat, everyone wants some particular something that fits his personal fancy. I think one of the biggest difficulties lies in trying to educate the executives of the corporations to know what comes first in an airplane and exactly what their need is. We all know that the aircraft available today are second best to what they really want.

"I think the Number One requirement, from the standpoint of the executive, is comfort. You're not going to have comfort in an aircraft unless you have pressurization. Any airplane developed for corporate use should have pressurization.

"The Number Two item is that the pilot must be satisfied. After all, he's flying the aircraft; he's the boss in that particular phase of his corporation's business. It's his business to make sure that his passengers are carried comfortably, safely and quickly.

"Third on the list is the landing gear. The corporation airplane must have a tricycle landing gear. Anybody operating without a tricycle landing gear is asking for trouble. I think you can do away with your drift landing gear if you have a tricycle gear. You can encounter all sorts of winds, as high as 40 mph direct on the side, with a tricycle gear and without trouble if you have reversible-pitch propellers.

"The majority of pilots I've talked to claim reversible-pitch props are a 'must'.

"Getting back to pressurization, you have to have an airplane that 90 times out of 100 can top most of the weather. It's much more enjoyable, much more comfortable and much safer to have a plane you can hold at 15,000 ft. while you're waiting to get a clearance to land.

"As far as range is concerned, about 1800 miles seems to be what most operators want.

"A definite standard cockpit arrangement would be highly desirable. A group such as the Corporation Aircraft Owners Association could save a company a lot of money if their member-pilots could get together and develop a standardized approved cockpit arrangement; an arrangement that isn't going to be changed every time a company buys another airplane. Every aid to navigation must be in that cockpit, too. All-weather flying is going to come into its own very soon."

"There are other items I could add, but those specifications are the major ones."

Mr. Speas: *"I wonder if you would say a little bit on the high-wing aspect. Just why are you interested in high-wing design?"*

Ralph Piper: "Mostly for passenger comfort in looking out. I think most pilots know what happens in the cockpit when your passengers are constantly walking from the front to the back of the airplane to get away from that wing so they can get a clear view down. . . ."

Mr. Speas: *"Mr. Henning, what is the thinking of your organization on this subject of the perfect corporate airplane?"*

MAIN REQUIREMENTS *of executives, according to Capt. Van Liew (left), are aircraft safety, comfort. Mr. H. P. Henning (right) reported GM wants a plane to carry 11 to 13 passengers*

Mr. Speas: *"Your mention of a standardized cockpit, Capt. Van Liew, is very interesting. Actually, the Round Table* SKYWAYS *had a month ago was on that subject.*

"Mr. Piper, you've had a great deal of corporate-flying experience. What are your thoughts?"

Ralph E. Piper: *(Chief Pilot, Monsanto Chemical Co.):* "Like every other company, Monsanto has its particular needs. I believe we'd prefer a high-wing airplane, preferably with more than two engines. At the present time we're trying to get too much power out of one package. When we lose one engine, we've lost more than 50% of our power. I like the idea that Beech Aircraft presented at one time—two engines on one propeller. It isn't necessary to have four props out there just because you have four engines.

"We like the idea of more than two engines on a high-wing airplane for many reasons. It would necessarily have a tricycle landing gear which makes for ease in getting in and out of the aircraft. We'd like to have the baggage compartment low and easy to get at, and we want a cargo compartment that we can stand up in. We get some strange sizes and shapes of cargo to carry occasionally.

The airplane should be pressurized, too. As for speed, I feel it's going to have to be in the neighborhood of 275 mph, with a ceiling that tops 95% of the weather.

H. P. Henning *(Engr. Check Pilot, General Motors Corp.):* "We made a little survey in our own organization recently and I've tried to consolidate some of the results. It reads like this:

"A passenger capacity of 11 to 13; a cruising speed that averages between 265 and 275 mph; duration at cruise power of 8½ to 10 hours; range, with full passengers and baggage, 1,000 miles. Opinions were divided on the high-wing or low-wing aspect. I think it came out about a 50-50 break in our group on that preference. The high-wing does offer obvious advantages from the standpoint of the passenger and his interest in the flight. However, very few of our passengers are flying just because they want to fly. They're flying to get somewhere conveniently, safely and quickly.

"The low wing does offer a slight 'extra' in safety. We don't like to think of emergency landings, but we're always faced with that proposition, and the low wing does offer more structure between the passengers and the ground, and there may be an increased safety factor there.

"As far as performance is concerned, we feel that the aircraft should meet T-category specifications as to accelerate and stop, take-off after critical engine out, and all the performance characteristics embodied in the T-category specs as presently outlined. Single-

engine ceiling of 14,500 ft., tricycle gear, pressurization—our group voted 100% on those items, and we went 100% for wing de-icing, either heated wings or the wet wing (alcohol wet wing de-icing), and all against de-icer boots.

"In studying our use of an airplane, I think you'll find we're typical of the majority of large corporation-aircraft users. We have about as many trips that call for use of fields not in the transport category as we have trips into fields that are airline terminals. It is, therefore, a question of getting one airplane that will fill all the needs or to use different types of aircraft. I think it's a challenge to the aircraft designers to set forth some specs of this nature, having in mind performance and range figures meeting T-category take-off and landing specs:

"For short-field operation; a minimum of 2,000 ft. of paved runway with 3,000 ft. of unobstructed take-off path; the airplane to be able to carry 6 passengers with 4 hours of fuel.

"For average field operation: 3,000 ft. of paved runway, 4,000 ft. of unobstructed take-off path; sufficient weight allowance for 10 passengers with baggage, 6½ hours of fuel at normal cruise.

"For transport field operation: 5,000 ft. of paved runway, 6,000 ft. of unobstructed take-off path; weight allowance to take care of 8 passengers, baggage and 10 hours of fuel.

"In talking about the weight allowance, let's assume the empty weight of the aircraft includes all the necessary navigational aids, including some that we are looking forward to in the future, such as airborne radar, dual VHF navigational equipment, VHF communications equipment, automatic pilot and approach coupler equipment. Those certainly are the minimum that should be included in the empty weight of the airplane.

"One item that wasn't covered in Mr. Morrow's survey is the aircraft electrical system. It is our feeling that we should go to the 110-volt alternating current electrical system.

"We'd also like to see some combination worked out to provide nacelle heating. The executive operator must carry his own hangar and maintenance equipment around with him. He isn't always certain of being able to get his airplane hangared, and cold starts are something to be concerned about. Any heating system in an aircraft should provide means of using that same heat to heat the nacelles for ease of starting in the morning. That about covers our thinking on this matter."

Mr. Speas: "*Was your survey among the users and the pilot group?*"

H. P. Henning: "Only among the supervisory pilots and the maintenance group."

Mr. Speas: "*One item of interest, Mr. Henning, was the variation of requirements rather than asking one airplane to do it all . . . to go into very small fields with a full load as well as the large fields. I'm sure the aircraft designers sitting down there at the other end of the table will breathe sighs of relief.*"

H. P. Henning: "Actually, we were only being realistic. If we could get any sort of agreement among the corporate aircraft users, it certainly would be more feasible, economically, to get one airplane designed and built that would serve the needs of a larger segment of the industry. To expect the airplane to fly out of 2,000-ft. fields with 10 or 12 people and 10 hours of fuel and meet T-category performance specs, is not being realistic. If we could get an airplane that would do that, it probably wouldn't have the necessary speed for transcontinental work. So, rather than spread our shots, like buck shot, perhaps we could get one aircraft that would serve a large segment of the industry. There may be a sufficient market to justify its development."

Mr. Speas: "*Mr. Lane, what is your thinking on requirements for corporate aircraft?*"

R. W. Lane *(Chief Pilot, Food Machinery and Chemical Corp.):* "Our needs are similar to those Mr. Henning has outlined. However, two different types would serve our company better. We visualize the aircraft that would fill our needs to be roughly along these lines: One, a longer range, higher speed, higher passenger capacity airplane that might cruise in the neighborhood of 300 mph and be able to fly non-stop and with sufficient fuel reserve from the West Coast to the Chicago area. It would be pressurized, of course. That would be one type which our company feels would serve our transcontinental needs.

"The other type would be a smaller aircraft carrying from 4 to 6 passengers, would cruise somewhere in the neighborhood of 200 mph and be able to get in and out of 2,000-ft. strips and have a 5-hour range of fuel. Although pressurization is something to shoot at in every plane, that could be passed up temporarily in the design of this smaller shuttle-type plane.

"That's the way it looks from our standpoint: one ship designed primarily for long range with all the characteristics and features necessary for safe operations and eventually safe all-weather flying; and the other ship which could sacrifice speed in favor of those characteristics which would enable it to get in and out of the short fields on shorter trips."

CHIEF PILOT *R. W. Lane expressed need for one long-range plane; other for short hops*

Cole Morrow: "You didn't mention the number of passengers you'd like to carry in the larger plane."

R. W. Lane: "Ten is what we figure."

Wm. B. Belden *(Asst. Secy. and Asst. Counselor, Republic Steel Corp.):* "Do any of the gentlemen here know of any sentiments within their own organizations with regard to any limitation on the number of corporation executives carried in one airplane at one time?"

H. P. Henning: "Yes. There is a feeling in our company against having all our eggs in one basket. I think that is one of the reasons for the limitation of passenger capacity as outlined."

Cole Morrow: "I'd like to add to that if I may. The size of the airplane that we might end up with is very definitely influenced by that limitation policy. While you may have 12 passengers booked for a business trip, a number of companies would prefer to divide that between two 8-passenger planes instead of one 12-, 14-, or 16-passenger aircraft. I think it's a matter that will influence the size of the market and the size of the airplane."

Mr. Speas: "*Mr. Littrell, you have a long background in the operational phases of aircraft development. Looking at the operational aspects, would you give us your comments?*"

Lester B. Littrell *(General Manager-Aircraft Operations, Pacific Airmotive Corporation):* "A multitude of excellent points have been raised this afternoon. It appears to me that there must be two or more standard corporate aircraft which will fit the needs of the corporation. Regardless of the size of the company, the nature of its business or the flights made, there are several factors of paramount importance in the design of the aircraft. One is the comfort of the airplane. If the industry is to further interest corporate officers in the use of aircraft, we should strive desperately to make the airplane more comfortable for those executive passengers who are paying the bills. We must keep in mind such basic essentials as good visibility, low noise level, seats that are comfortable and not crowded, and a public address system. After all, many passengers want to know what they are looking down upon. The cabin should accommodate from 4 to 8 passengers. In the matter of pressurization of the cabin, cost should be kept in mind. Pressurization should be developed only for those aircraft that will be flown at high altitudes.

"Getting back to the basic factors of safety, comfort and cost, the airplane should be twin-engined, with a safe single-engine performance of 7,000 to 10,000 ft., with a range of approximately 1,000 miles. The airplane should be of all-metal construction, which will contribute to safety, cost of manufacture and maintenance. I think we all agree that it should have tricycle landing gear, which not only adds to safety in a crosswind landing, but gives the pilot better visibility on the ground. It should have a speed of 175 to 200 mph, and should be able to land slowly enough to permit its usefulness at smaller fields and at higher altitudes where a longer field might otherwise be required.

(*Continued on page 40*)

SKYWAYS FLIGHT OPERATIONS ROUND TABLE

Skyways Round Table

(*Continued from page 39*)

"For extra economy and safety, the airplane should be of low-wing design. This provides for additional structure between the passengers and the ground. The low-wing construction also provides for shorter, light weight and less costly undercarriage.

"The airplane should have sufficient radio-navigational aids and de-icing equipment to accomplish all-weather flying in complete safety. This will enhance utilization and afford greater satisfaction in the use of corporate aircraft.

"Along maintenance lines, the aircraft should be designed to afford access to those points or parts known to require frequent inspection, such as hinged access doors, cowling, etc. Those of you who are concerned with the building and maintenance of aircraft recognize the economics of this type of design. Another thought, quick disconnects wherever feasible contribute substantially to cost and maintenance cycle time.

"This covers what I believe to be the essential factors in the design of the ideal corporate aircraft."

CORPORATE NEEDS, *observed L. B. Littrell, call for development of two or more aircraft*

Mr. Speas: "*The item of maintenance cost certainly is important, and I'm glad you brought it up. With the background you have on the maintenance side, your suggestions will be put down in the notebooks of the aircraft designers.*

"*Mr. Rogers, have you any suggestions?*"

James A. Rogers *(Pilot, Swiflite Aircraft Corp.):* "I guess up to this point we all seem pretty much in accord with what we want in a corporate plane. As far as Swiflite is concerned, our usual number of passengers is 10. In regard to cruise, we would like something in the vicinity of 250 mph, an 8-hour range. We'd prefer a low-wing airplane with a tricycle gear. Going into the subject of cabin interiors, we'd like to stress the point of sufficient headroom. Our executives are pretty big boys, and when you see them getting into a plane or coming out, you sometimes wish you had a couple more feet up there. In addition to ample headroom, we'd also like good aisle width so we don't have to turn around sideways to go from the front to the back or the back to the front of the plane.

"In the matter of seating, we'd rather have chairs. A great many of today's corporate planes have a couch, but I rarely see the couch being used during flight. We'd prefer to have 10 chairs that will allow ample reclining.

"Pressurization is something we go along with, too. I think if we had pressurization it would be an inducement to the executives to use the airplane a great deal more.

"Another necessary item for consideration is a thermostatic heat control. Many passengers may not want to disturb the pilot to ask for more heat or less heat. A control in the cabin to permit the passenger to regulate the heat to suit himself or something automatic to regulate the temperature would make it a much more enjoyable operation.

"We'd also like to see ample room in the cockpit for the crew, and room to allow for future installations of new navigation equipment as it comes on the market. We'd like to have an airplane you don't have to tear apart to install this equipment.

"Elaborating a little more on Capt. Van Liew's views on standardization, we tried to standardize our *Lodestars.* And in the process of doing so, I made it a point to look over a good dozen or more *Lodestars.* I don't believe I came across two that were anywhere near identical. Everybody apparently has his own conception of what he wants.

"As far as baggage space is concerned, we'd like to have about 70 or 80 cubic feet—and a portion of that to be accessible from the interior.

"I guess that covers our report, Dick."

Mr. Speas: "*Before we go on, there's one other point I'd like to toss on the table. Is there any desire on the part of the corporate pilots or plane owners for air-cooling?*"

Capt. Harry R. Van Liew: "I think air-cooling is one of our greatest problems. As we all know, the airlines have been carrying around auxiliary air-cooling units, and they certainly are not adequate. Most of us here are familiar with the heat that builds up in a cabin of an airplane that has had to sit in the middle of an airport for four or five hours, waiting for its passengers to put in an appearance.

"When you think of the money the airlines spend on their cooling systems, it seems to me one of the greatest things would be a built-in cooling system in a plane instead of having to have an auxiliary unit carried around on a set of wheels and plugged in. The airlines have tried all sorts of things and they all seem inadequate. Once you've started an aircraft, the only way to get cooling is to de-pressurize and operate the first 10,000 feet without pressurization. I'd say one of the greatest desires in air transportation, whether it's airlines or corporate aircraft, is to have a built-in air-cooling system on an airplane. Weight may make it prohibitive, but from the comfort angle, it seems to me it should be looked into.

"As far as present-day air conditioning is concerned, it's very poor on the *Constellation.* The DC-6 is fairly good, but at its best, the ventilation system and pressurization is poor.

"The internal heater arrangement on de-icing equipment is not really the answer. You get into an icing condition and the flow back is bad. You get into heavy ice and it builds up on your rivets back of the heated portion of the wing and it disturbs the air flow to such an extent that it's much better to operate in an icing situation without any endeavor to take the ice off. It flows back and creates real concern.

"In this corporate-aircraft business, there's one factor that none of us can afford to overlook—and that's this matter of economy: economy of operation and economy of maintenance. There are a great many people more profound than I who feel that we're going into some sort of a recession. And when that dark day arrives, the Boards of Directors of these corporations are going to take a very dim view of the costs of some of the aircraft they're operating. I think one of the things that has to be done is to bring about a coordination between the aircraft, the flight section and the traffic department of a corporation so that the company gets maximum utilization and greater economy in both maintenance and operation so that costs can be brought down to approach the cost of passenger-miles of the airlines. The executives of these corporations aren't going to want to give up their airplanes, but they may be forced to do so by their Boards when a pinch comes."

R. T. Amis, Jr. *(Pres., Aero Design & Engr. Co.):* "I think that for the record here the boys are all saying what they want, how they want it, how fast they want to go . . . but they haven't stated how much they want to pay for it. I'd like to have a short statement as to passengers, speed and how much money they're willing to spend for it."

Mr. Speas: "*Well, now that we've heard a lot about what is wanted in a corporation airplane, the cost of getting it is probably the next step. Capt. Van Liew, what do you think the owners would be willing to pay?*"

Capt. Harry R. Van Liew: "I'd say it all depends on the corporation. I've dealt with some that had millions of dollars in the till and if you mentioned more than $50,000, they'd scream like Comanche Indians. By the same token, I've found that other companies, not having too much money, are perfectly willing to spend any amount. I guess the present tax deduction set-up helps out. But over-all, I'd say they don't want to spend more than $185,000 to $200,000 for any one particular plane that will carry 5 passengers."

Mr. Speas: "*Mr. Rogers, what would be your estimate?*"

James A. Rogers: "I'd bring Capt. Van Liew's figure down to about $125,000."

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Lester B. Littrell: "That's my guess, too."

Cole Morrow: "I think what we have to do is to set forth our requirements, then let the manufacturers tell us what it's going to cost. Then we'll turn around and evaluate that as to whether it's economically justifiable in our business. If we have a market, then we can go ahead. The cart's in front of the horse when you ask a man what he wants and how much he wants to pay for it, because I don't want to pay any more than I have to."

Mr. Speas: "*I think Mr. Amis was about to give us some ideas as to what a plane such as we've described might cost. But perhaps he'd like to know first what the general feeling of the executives is and how much they're willing to pay for their vehicle.*"

Cole Morrow: "Well, one thing that is going to very largely affect what the airplane is going to cost is how many aircraft are going to be sold. And that gets back again to the specifications of an aircraft that meets the requirements of the largest segment of the industry. Mr. Henning brought that out. There are so many variables that are going to affect this cost that I don't think you can determine in advance, before the engineers have even told us whether our suggested aircraft are possible or not."

Mr. Speas: "*Mr. Henning, do you have any idea of the values your people are thinking of?*"

H. P. Henning: "Due to the variables Mr. Morrow spoke of, plus the variables of the dollar's value, whether it's a Truman dollar or a good dollar, I think the only thing we can do is to go back and see what has been done. We know, for example, that there are a few corporations that have been willing to go as high, investment-wise, as $400,000 and $450,000 per copy. That, however, isn't a really true picture because we haven't had anything available to us. How can we say there aren't corporations that would spend $250,000 per airplane if they had an airplane available to them that would begin to meet their requirements? I'm in accord with Mr. Morrow that to try to put a price figure at this stage of the discussion is impossible.

Mr. Speas: "*Mr. Pague?*"

Walter C. Pague *(Chief Pilot, Armco Steel Corp.):* "I can only summate what already has been said. I go along with Mr. Lane who advocates greater safety, comfort and range. I agree, too, that we should have lower costs for this airplane.

"Capt. Van Liew seems a bit pessimistic regarding the economic status of our part of the industry. Many of us can remember just four or five years ago when corporation aviation was more or less in a state of recession. At that time many corporations gave up their airplanes, but many, many more bought airplanes than gave them up. I feel that corporation flying has become a very definite part of the operation of a company.

"So far as the requirements of the aircraft are concerned, I can't add very much. I think, first of all, that we have to sell our corporation executives on what they want; secondly, on what the pilots want. What the corporation will buy is often based upon the pilot's recommendation. The executive wants a safe airplane and he wants a comfortable one, and if he feels the pilot is satisfied with what he has, then he's happy, too."

Mr. Speas: "*Mr. Pague, there's one particular point on which there seems to be a difference of opinion. That's the high-wing vs. low-wing and the number of passengers . . .*"

Walter C. Pague: "Judging only from the conversations I've had with pilot personnel around the country, I'd say most want an airplane that will carry from 6 to 12 passengers. I don't think the high- or low-wing aspect is of any particular importance to either the pilot or his passengers.

"I do think from a safety standpoint that very serious consideration should be given to the use of wing-tip tanks rather than integral wing tanks. I'd like to see these wing-tip tanks used entirely as a means of carrying fuel. It's a big safety factor we shouldn't overlook."

Mr. Speas: "*Mr. Belden?*"

Wm. B. Belden: "I'm probably the only person who's spoken so far that may speak purely as a passenger. I've never flown a plane . . . I've never been in the cockpit of a plane, but I've ridden in our planes and I've watched our executives go away on business trips in them. Believe me, there isn't anything that's as important to the passenger sitting back there in the cabin as the knowledge that his plane is a safe plane, and that his pilots are satisfied with it and have perfect confidence in it.

"I'd like to say here that I think the record that has been made by corporation flying is remarkable. That great safety record must indicate our planes are adequate and the people who fly them are doing an excellent job. Whenever you talk about a plane, what you're going to build, just make sure the Number One factor is safety. You can put the other necessary factors in whatever order you please. Just make sure safety is first."

TRANSPORT *that will carry 6 to 12 passengers, Walt Pague stated, is what most pilots want*

Mr. Speas: "*Without your comments, Mr. Belden, this would have been a very one-sided conference. The passenger is, after all, the corporate-plane customer.*

"*Mr. Boggess, what have you and Sinclair to add to the discussion?*"

Henry W. Boggess *(Director of Aviation, Sinclair Refining Co.):* "I should like to speak for just a moment from the standpoint of an operator having three classes of airplanes based in 12 geographical locations. I have been impressed by the many splendid suggestions that have been made by members of this panel. Largely the points brought out by several panel members represent our thinking. We feel that there may be two types of multi-engine executive aircraft needed by American industry. One is an aircraft having a range up to about 750 miles. This smallest of the two types should have a gross of approximately 12,000 lbs. and should comfortably seat 4 to 6 passengers with adequate cabin room for spacious seating, with separate baggage compartment and rest room. Such a multi-engine executive airplane would serve approximately 75% of my company's flights. The other 25% of our flights would require a longer range aircraft, having a gross of approximately 20,000 lbs. and a range up to 1600 miles. Certainly both of these planes should be pressurized. Pressurization is important in executive flying because so many corporate executives and officials are men of middle age or older, many of whom have high blood pressure and heart conditions. Pressurization will help insure their comfort and their safety and certainly will encourage them to do more flying.

"I am wondering if we actually have a meeting of the minds when we speak of the number of passengers we want to carry. Rather than speak in terms of the passenger-carrying capacity of an airplane, I think we should define its gross weight and its internal dimensions, leaving it up to the individual operator as to how many seats and couches are placed therein and whether or not such a luxury item as a galley is to be installed. There may be some operators who need to carry passengers as the airlines do: literally, as sardines in a can. As for my company, we prefer roominess, and I fear we will not get it if we speak in terms of passenger-carrying capacity.

"As to cockpit equipment, instrumentation, navigational aids, electronic accessories, etc., I would certainly like to see corporate owners lead off with a standardization program. It is quite possible that it would be difficult to get an agreement on cockpit standardization. Nevertheless, if it could be done, many economies should ensue. We are trying to effect cockpit standardization in our own organization; we do have what we call a standard panel layout, but as between types of our airplanes, I still find the gear switch in different places, the DG's at various locations. A standardization program would be a long-range accomplishment.

"Of the many things that have been suggested by this panel today, I am particularly impressed with nacelle heating. Every op-

erator needs this badly. So far as speed is concerned, whether it be for the shorter range aircraft or the longer range one, I think my company would like to have a plane that would indicate between 250 and 275 mph. Naturally we are looking for economy of operation. Also we'd like maintenance simplicity. The manufacturers of the de Havilland *Dove* have given us something to shoot at in the matter of maintenance simplicity. Good engineering should shorten the time necessary to change an engine and should make it possible for us to change accessories with much less trouble than in most airplanes we are flying today. Maintenance simplicity is very important to the corporate operator who is on and off fields where A&E's are not always available. Daily maintenance problems do arise and they must be met; quite often the crew must be able to take care of minor maintenance problems at isolated and remote places in order to be off and gone.

"The tricycle gear is certainly a 'must'. Of course ground cooling of the interior of an airplane would increase passenger comfort, but I am wondering if a self-contained air-conditioning unit that would do an acceptable job would not add excessive weight and, therefore, rule itself out. De-icing equipment is more of a safety factor and hence more preferable than ground cooling equipment.

"In summary I have tried not to repeat many of the splendid suggestions of the panel members who have spoken ahead of me, but I should like to conclude by saying that I believe we would save time and give the manufacturers a better idea of our composite needs if we were to confine our recommendations to these important features:

1. Gross Weight.
2. Cabin, toilet and baggage compartment dimensions.
3. Indicated airspeed.
4. Range.

"These are the basic needs. Additionally all we would need to specify would be such items as tricycle landing gear, nacelle heating, maintenance simplicity, de-icing and such. Certainly, we can each choose seating arrangements and instrumentation."

R. W. Lane: "I'd like to make a comment or two, Mr. Speas. The first is in regard to a standard—not only of transport aircraft cockpits and instrument panels but also of airplane and engine parts, attachments and accessories. Cockpit standardization would result in increased safety and efficiency, and engine and airplane standardization would result in increased safety and ease of maintenance.

"The second item which I feel should be given considerable thought in designing a new corporation transport aircraft is simplification. We have been too prone in the past to add gadgets and new devices in a helter-skelter manner. While the primary purpose of many new devices has been to increase safety and/or efficiency, we have almost defeated our purpose by increasing complexity. Sufficient planning of these considerations could give the new corporation transport simplification along with added safety and efficiency."

Mr. Speas: *"Thank you very much, Mr. Lane. Now, gentlemen, that seems to complete the operators' view on the matter of a good corporate airplane. Let's see what the manufacturers have to say in reply.*

"Mr. Page, you've been in the aircraft design business a long time and are one of the highest regarded designers in the business. Could we have your comments, please?"

George A. Page *(Dir. Engr., Aeronca Mfg. Corp.):* "I'd like to say first that the general basic specifications I've heard here today are entirely reasonable and realistic. They all fit into a pattern that engineers could work with quite well. Of course, a number of aircraft have been described here today, and it would take quite a bit of time to sift all the suggestions down into their categories. If I may, I'd like to generalize a bit.

"First, I'd like to point out, as far as economy is concerned, it always is the smallest airplane that serves a given purpose that is the most economical, both to buy and to fly. We must remember that in taking the specifications you've offered here today and boiling them down into something specific.

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For example, the desire for full stand-up headroom is very nice, but when you evaluate it, you might find out that full stand-up headroom vs. less than full stand-up headroom might cost 10 mph cruising speed with an otherwise identical design. That calls for some careful consideration.

"Capt. Van Liew spoke of operating costs in executive airplanes that would roughly parallel those of the airline aircraft. A big point there to remember is that it's the number of hours the airliners are operated that brings the cost down. In the corporate field the best we can apparently hope for at the present time is something around 600 hours a year. The airline aircraft are operated somewhere in the vicinity of 3600 hours. That's quite a difference, and I can't see where we can get any cost comparison there at all.

"Scanning the cost department again, if you take the empty weight of all present-day airplanes in the multi-engine class and plot them against purchase price, excluding fancy navigational equipment and special radio, it is amazing to note how they fall in a bracket of around $16 to $22 per pound, regardless of how small or large the plane is. If you want to know what this airplane you're after is going to cost, predicated on a minimum production of 200 which would allow you to amortize your development cost and your tooling at the rate of ½% per airplane, just figure out what it's going to weigh empty, and multiply it by about $20 and you'll have your figure.

"It is interesting to note that no one has asked for a 400- or 500-mph airplane; no one has asked for turbine powerplants. To get that performance, you must go high, and pressurization would be essential. You'd have to have engines that are highly supercharged, and those engines now are available only in the military and airline series."

Mr. Speas: "*That was an excellent summary, George. Next I'd like to call on Mr. Williams, a Supervisor in Confidential Design for North American.*"

E. T. Williams *(Supervisor, Confidential Design, North American Aviation):* "From the studies that we've run at North American, it seems entirely possible to design an airplane that meets T-category and still cruises at approximately 275 mph for about 1,000 miles. It can be pressurized and feature most of the other things you've asked for, including short-field landings, *i.e.* 2500 ft."

Cole Morrow: "Is the critical point take-off or is the critical item landing?"

E. T. Williams: "Thus far, landing has been critical in our studies. Take-off has been no problem."

Cole Morrow: "Without reversing props?"

E. T. Williams: "Yes, without reversing propellers—over the obstacle without reversing props. The CAA will not accept reversing props for certification. One of the airplanes described here, with an 1800-mile range, full passengers and 275 mph cruise capability, means a high take-off weight. Perhaps more than you'd want and, in this case, the field length goes up."

AIRCRAFT *with 275-mph cruise, 1,000-mile range, to meet T-Category is possible, reported Mr. Williams (left), North American*

Mr. Speas: "*Mr. Gerteis?*"

J. H. Gerteis *(Asst. Chief Engr., Cessna):* "We at Cessna haven't actually made a study such as Mr. Williams of North American talks about, but we have broken down corporations in much the same way you gentlemen have broken down the airplane. We see the operation of airplanes in corporations as one of a few big men in big corporations that require deluxe equipment to travel from one point in the country to another. At the same time, we see the businessman who can't spend the amount of money, taxwise, for the equipment you men have been talking about. He, therefore, must be content with a much smaller airplane than you've visualized here. From the manufacturer's viewpoint, that's the direction our thinking has been turned to. Like Mr. Amis, we've been quite concerned about costs. That's something we must consider. We have to know the package we're shooting at, even at the beginning.

"We are all striving for more comfort; we all want greater ease of maintenance and lower operating cost. We want all of the things that contribute to comfort and speed. Now some place in between all of those desires and those things that we have now must lie this corporation airplane that we're trying to visualize here."

Mr. Speas: "*Mr. Harmon of Beech Aircraft is here, and we're all familiar with the work done in the air-transport field by Beech.*"

Ralph Harmon *(Chief Design Engr., Beech Aircraft):* "Well, gentlemen, I've found the general tone of this discussion to be on a much more practical level than I had anticipated. I guess I failed to realize whom I was dealing with. Having been in the business of building a rather large share of the corporate aircraft, I think the trend of the discussion has a lot of practical merit. However, as Mr. Page mentioned, it's going to take a bit of time to sift this down and screen out the chaff so that we can fit the pieces together. An airplane is a pretty complicated piece of machinery.

"Any airplane that Beech or any other manufacturer would design would have to have a 10- or 15-year airframe. One of the lower bracket airplanes mentioned here would do very well with piston engines. We have turbines and turboprops coming. Within the next 10 or 15 years, these engines will be developed and be practical, economically, for aircraft of the type we've discussed.

"There is quite a difference in planning for turboprop or jet and piston engines. The aircraft are of entirely different character and have different characteristics. The thing that we, the manufacturers are interested in is can we sell it and can we make some money on it. It's been pretty difficult in the past to make money in this business.

"More or less in preparation for this day, I have set up six hypothetical airplanes. These specifications that I'm going to read to you are to provoke your comments. I'll run through them quickly.

"Gross weight, 35,000 lbs.; 17-place; turbojet; 425-mph speed; range of 1,000 miles; initial cost of this airplane would be in the $500,000 bracket; cost of operations we'd guess to be $1.50 per mile.

"Gross weight, 28,500 lbs.; 14-place; piston engines; cruising speed, 330 mph; range of 1400 miles; initial cost would be about $350,000; operating cost about $1.25 per mile.

"Gross weight, 24,000 lbs; 15-place; turbojet; cruising speed, 350 mph; range of 1,000 miles. This one's in the *Lodestar* class. Initial cost would be $400,000, with operating cost at $1 per mile.

"A piston-engine version of this has a 20,000-lb. gross weight. The difference in gross weight between this one and its jet counterpart lies in the fact that although the jet engine is lighter weight, the fuel makes up the difference. This one carries 15; has 260-mph cruising, a range of 1400 miles. Initial cost would be $325,000 and would cost 70¢ a mile to operate.

"Another one is in the 14,000-lb. category; is 12 place; has 300-mph cruising, 1,000-mile range; is turbojet powered; would cost $300,000; and 65¢ a mile to operate.

"Here's one that I think fits the discussion today. Gross weight, 12,000 lbs.; 10-place, 225-mph cruising at 15,000 ft.; range, 1300 miles. This one would cost about $200,000, and 45¢ a mile to operate.

"It was mentioned earlier that perhaps $20 per pound was a good figure on the empty weight. If you run out these figures I've just given you, you'll find they come out a little higher than $20 per pound. The reason is that I don't believe we can operate that efficiently with our labor problems, general cost of living index and the multitude of other problems that go into developing a new airplane. Most of the cost of tooling of the aircraft you've been buying has been written off; that's why you've been getting your airplanes cheaper. For these new airplanes, we have to re-tool and re-develop many of the

items. For example, you want pressurization. If you're talking about a 12,500-lb. airplane, there isn't any practical pressurization equipment for that airplane. It's all for larger aircraft like the Convair 240, etc."

Mr. Speas: *"Mr. Amis, do you still want to see the picture on the corporate-plane dollars, or do you have any comments to make?"*

R. T. Amis, Jr.: "Of course, as you all know, we've just come out with our version of what we thought was in the price range the corporation-aircraft owners would pay for a small airliner. This is our Aero *Commander* which is a twin-engine high-wing light transport, capable of carrying either 5 or 6 people at a cruising speed of 197 mph. Our concept of a small corporate plane included a cabin of good size, high enough to sit up in it with your hat on and long enough to permit you to stretch your legs, and easy to get in and out of. As someone mentioned earlier, these gentlemen for whom we designed the plane are advanced in age. They don't get to be presidents of corporations when they're 25 years old.

"Our second thought was for speed. We felt our airplane had to at least compete with airline speeds on a run, for example, between Oklahoma City and Chicago. Naturally, we're not quite as fast as the airlines, but with the stops they make we can beat them a little bit.

"There is a definite need for an airplane larger than the one we are making. There is a market for a bigger plane with a little more range and more carrying capacity. But what the corporations would be willing to pay for such a plane and what the market would be is dependent on what the builder of the plane can finally produce. It may be that to get the desired roominess and comfort, some of the speed may have to be cut back. After all, at 250 mph with an 8-hr. range, a loss of 25 mph in speed wouldn't make a great deal of difference."

Mr. Speas: *"Now let's get to the heart of the airplane, the engine, which is the item around which the airplane is really designed. Mr. E. M. Lester of Fairchild is an authority on that subject."*

Mr. E. M. Lester *(Asst. Genl. Mgr., Fairchild Engine Div.):* "The engine manufacturer seems to be in his characteristic position: low man on the totem pole, the guy who's carrying the darn thing. Listening to this discussion, it strikes me that the corporation-owned aircraft is going to have difficulty in meeting the requirements requested here, because of the lack of engines specifically developed for such aircraft. As always, it's impossible to design, build and shake all the bugs out of an engine for a specific design of an airplane unless that specific design happens to be of military importance so that an adequate volume of engine production can be assured in that particular type of engine to make its cost to the user in any way reasonable.

"To compare the probable engine-cost figures with those that George Page mentioned for the airplane, it appears to us now that about the best we can expect with today's dollars for production engines of the turbojet type is something on the order of $10 per pound of thrust delivered. Since the engine normally will weigh about one-third of a pound per-pound of thrust delivered, then the cost in terms of engine weight is going to be somewhere on the order of $30 per pound. That becomes a rather expensive engine.

"The turboprop engine will be even more expensive because of the added problems of more complicated machinery, gearing and controls.

"Another thing, for the uses to which this corporation aircraft will be put, it doesn't appear that the very large turbine engines currently being developed and currently available to the military will be applicable because of their size. The corporate-aircraft turbine engine will have to be somewhat smaller. Therefore, the only American engines that will be available are those that were developed some years ago, initially as prototypes or experimental models, and are of the smaller size. However, since they are older, they are necessarily less efficient and will give the operator higher operating costs, more operating difficulties and probably higher maintenance.

"As far as piston engines are concerned, we all know that there is little or no extensive development underway on existing piston engines. Therefore, the engines that are available today are substantially those which must be used for the corporation-owned aircraft, with, of course, some minor modifications that can be made within a given model or type.

"There are a couple of items which I think are of interest in considering these corporate-aircraft requirements, because the engine type has a strong influence on meeting those requirements. Emphasis has been placed here on comfort, with that category broken down into pressurization, air conditioning, low noise level, low vibration level. All of those items, as we see it at the moment, can be accomplished more effectively in the turbine type of engine. To gain those advantages, you are going to admit the necessity of paying heavily in operating costs. For example, fuel cost. As we know the performance available today and in the reasonably near future (possibly the next 5 or 10 years), the fuel cost of a turbojet-powered airplane will probably be something more than double that of the corresponding piston engine-powered airplane at the same speed and gross weight in terms of gallons per mile.

"There is another possibility that may have some affect on the corporation-owned aircraft, particularly in the larger sizes. A few tests have proved that the addition of a small amount of jet thrust for take-off purposes on a transport-type airplane very materially improves its load-carrying capacity and still stays within a given set of performance requirements, specifically on take-off. That may or may not affect the larger type corporate airplane, enabling it to meet some of the requirements specified here at this meeting, particularly in short field take-off and for added safety in the case of critical engine failure. Engines to accomplish that, however, are not yet available, but they probably will be within the next 5 years."

DEVELOPMENT *of corporate plane, warned Ev Lester, will be held up by lack of engines*

Mr. Speas: *"Mr. York, what is Continental Motors doing, relative to the needs of the corporate aircraft?"*

L. L. York *(Asst. Sales Mgr., Continental Motors Corp.):* "The engines we have currently in production fit a smaller airplane than has been under discussion today. Some development is in progress on those engines; we're providing more drive pads on the engines than we've had in the past, and we're working on a low-cost supercharger. The reason a supercharger hasn't been built thus far is because the smaller airplane has not been a vehicle justifying a supercharger. With an indicated airspeed of 100 mph, if you go to 20,000 ft., the amount of improvement is so low it isn't justified. Now with a 200-mph airplane, it makes some sense.

"One thing that was mentioned here today that was interesting to me is the four-engine desirability. I didn't know there was any consideration of this idea. It has obvious advantages. Currently, four-engine airplanes suffer a little, performance-wise, because so much of the wing is covered by nacelles and so much of it is prop wash. Four nacelles using ducted fan or jet would give you, I believe, a good clean wing setup, and I think you'd have good span-wise efficiency.

"There is one question I'd like to ask. I'd like to know what the reaction of the owners or passengers would be to a turbine. Would they be afraid of them? The turbine definitely is here. Its development may suffer some delays . . . all developments do, but I wonder how much of the delay is going to be affected by the psychological aspects. Things turn pretty fast on a turbine . . . 35,000 rpm is the speed we turn our turbine engines. These engines will be available as shaft turbines, jets, air sources for bleed-off setups, and ducted fans. The turboprop has been mentioned, but a few pretty serious problems, gearing and propeller problems, are existent today. Those problems aren't easy to lick."

Mr. Speas: *"Mr. York, would it be possible for you to timetable this turbojet development*

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Skyways Round Table

(*Continued from page 45*)

for us, and what is your opinion with regard to availability?"

L. L. York: "Well, the geared supercharger engine, which will be a 300-hp engine weighing about 490 to 510 lbs., is a year to 15 months away.

"The turbine engines and their availability have to be premised on what the military requirements will be. We don't know exactly what it is, but it appears to be considerable. As far as turbine cost is concerned, we've gone on record that we anticipate, with a reasonable production, that the turbine will cost less than the piston engine per horsepower. We also believe that it will never reach the cost of the piston engine per pound.

"Some time ago the Lockheed people compared the cost under the present market for the operation of a stage coach and the cost of operating an F-80. The cost per ton mile was about equal . . . I guess it was within 1% or 2%. Of course, there was a speed differential of some 500 mph. And that comparison was premised on commodity value—I guess they hung it on corn or some other such barometer for each of the periods involved. Horses are expensive, you know."

Mr. Speas: "*Mr. Henning, would you give us your thoughts on what the passengers may think of the use of turbines in corporate planes?*"

H. P. Henning: "Yes, but mine will certainly be a curbstone opinion.

"I think the personnel using the executive aircraft would have no compunctions about riding behind a turbine. I think they are well aware of the developments in the turbine field. I don't think that psychological factor would enter into the acceptance of it at all."

Mr. Speas: "*Time seems to have run out on us. In closing I would like to thank the participants of the Round Table for their extremely interesting comments and discussions which, I am sure, will be valuable to all who are interested in the corporate-plane field. I would also like to thank the many kibitzers here this afternoon.*

"*The fact that the 50 to 75 spectators have quietly listened to what has been said here is a tribute to the discussions that have gone on, especially in view of the fact that all spectators have a primary interest in the operation or management of corporate aircraft. I am sure we all owe a debt of gratitude to* SKYWAYS *for giving this subject the benefit of their Round Table treatment.* SKYWAYS' *round table series is becoming a very important contribution to aviation thinking, and the future of corporate aircraft development will undoubtedly be benefited by this meeting. Will you also accept the personal thanks of the chairman for making his job so pleasant and easy.*"

SUPERCHARGED ENGINE *in the 300-hp class and weighing 490 to 510 lbs. is a year to 15 months away, according to Lock York's (left) observations. Turbine is even further in future*

CAOA SURVEY SUMMARY

Aircraft now in operation by corporate owners	Douglas DC-3's, Lockheed Lodestars, Venturas, Grumman Mallards and Widgeons, Ryan Navions, Beech Bonanzas, De Havilland Doves, Cessna 190's, Aero Commanders, B-23's and B-25's.
Average range of flights	450 miles
Maximum range of flights	1,150 miles
Average hours utilization	596 hours per year
Size of airplane desired:	
4-to-6 passengers	13%
6-to-12 passengers	60%
Over 12 passengers	27%
Cruising speed:	
Average	207 mph
4-to-6 passengers	207 mph
6-to-12 passengers	256 mph
Over 12 passengers	273 mph
Other requirements:	
Pressurization	80%
Tricycle gear	99%
Reversible Props	77%
High Wing	27%
Low wing	73%
Lavatory	98%
Galley	55%

Note: If operator wanted single-engine 4-to-6 passenger plane, his obvious lack of need for lavatory and galley was considered, not included.

Editor's Note: In an effort to find solution to the various problems aired by participants at SKYWAYS Round Table discussions, SKYWAYS is bringing these discussions to the attention of those agencies, manufacturers, etc., having directly to do with solutions to the specific problems. We will report the results to our readers from time to time.

Automatic Feathering

(*Continued from page 15*)

for automatic propeller feathering. However, CAR 04.b.0 does state that, if any of the requirements therein becomes inapplicable because of the development of unforeseen design features, the Administrator shall accept designs shown to provide an equivalent standard of safety."

So, automatic feathering became a feature of some of our new transports, without the operators or the pilots ever having had the opportunity of participating in the decision. In this regard, the following excerpt from an engineering report of one of the first airlines to operate planes equipped with the new and controversial device, is of interest:

"*The CAA has apparently decided that the safety of operation using automatic feathering on take-off is equivalent to the safety provided under 04a and 04b. The CAA apparently issued this decision without consulting the transport operators or their representatives.*"

Within a remarkably short period of time after this CAA policy was issued, the M-202 and the CV-240 were flying on the airlines with auto-feathering systems installed and their gross weights determined by their ability to meet the take-off climb requirement with the propeller feathered rather than with it windmilling. In 1949 the B-377 was put into service with automatic feathering, and in 1952 the special long-range version of the DC-6B, the M-404 and the CV-340 appeared with it. It is of interest to note that, in spite of Dr. Oswald's initial thinking about auto-feathering, it was only this year that it made its bow on a Douglas design. The weight increases permitted by auto-feathering were substantial, amounting to over 10,000 lbs. for the B-377; 4,000 lbs. for the DC-6B; and approximately 2500 lbs. for the M-202 and CV-240.

Protests about the CAA's approval of this "gadget" were immediate on the part of some operators and the pilots. The objections to the device were centered on two main points: 1) the decreased over-all level of climb performance caused by permitting a feathered propeller in demonstrating the required rate of climb; and 2) the unreliability of the automatic-feathering systems and the additional and unnecessary hazard introduced by their malfunctions during take-off.

At first glance it might appear that whether the propeller was feathered or windmilling would make no difference in performance because in either case the plane would climb at the same rate of $0.035V_{s_1}^2$, the gross weight having been adjusted in each case to permit that rate of climb. However, in the case of an airplane not equipped with automatic feathering, a higher rate of climb than $0.035V_{s_1}^2$ was available as soon as the propeller was manually feathered. Since this increase in the rate of climb could be quite appreciable, and since the duration of the windmilling segment would be only a matter of a few seconds while the remaining climb-out would be made with the increased performance available with the propeller drag reduced by feathering, it can be seen that the over-all take-off climb performance of an airplane certificated with auto-feathering deteriorated considerably except for a very transient period immediately after an engine failure on take-off. In the case of the B-377, for instance, automatic feathering meant a loss, at full gross weight, of approximately 130 feet per minute rate of climb in all segments except the brief second segment. This is more than a 25% decrease in over-all performance, so it is not surprising that the pilots objected, especially when it is realized that the performance decrease, percentage-wise, was even more spectacular in the case of the twin-engined planes.

The criticisms voiced by both operators and pilots that automatic feathering was too complicated and would prove unreliable and hazardous have been well proven over the years. For instance, during a six-month period in 1949 there were five instances reported to the CAA of false auto-featherings during take-offs, cases where the device malfunctioned and actually feathered a sound engine. A typical report is:

"*Aircraft returned to ramp after take-off*

(*Continued on page 48*)

Automatic Feathering

(*Continued from page 47*)

with right engine feathered and pilot reported same feathered automatically on take-off for undetermined reason as no loss of power noticed at any time during take-off. Inspection of propeller wiring revealed shorted wiring at Cannon plug connection at automatic feathering pressure switch."

While it may be said that the reliability has improved some since 1949, there are still instances of failure such as the one on September 5, 1952:

"*During take-off No. 4 propeller automatically feathered even though BMEP indication was 214, with 60 inches MP and 2700 RPM. Propeller was manually unfeathered. Power returned to engine and take-off completed. Subsequent operation normal, faulty auto-feather pressure switch was changed.*"

On February 27, 1951 at Tulsa, Oklahoma, a serious, though fortunately non-fatal, accident occurred to a CV-240. The Air Line Pilots Association report on that accident says in part:

"*Investigation showed that the left engine had not failed and that auto-feathering occurred due to a failure of the pressure valve which controls the automatic feathering device actuating mechanism . . . The emergency which resulted was entirely due to the failure of a component of the automatic feathering device and the resultant accident can be directly attributed to this cause.*"

In contrast to this record of the loss of engine power caused solely by failure of the device designed to provide "equivalent safety" (at increased gross weight) in case of engine failure during the critical take-off period, is the statement of an experienced CAA official that "CAA records reveal that there are only two powerplant failures on record occurring during the critical point of take-off since transport operations started." Perhaps this man's definition of the critical point of take-off is too restrictive, for the author can recall for one aircraft type alone within the past 18 months three engine failures at or very shortly beyond the attainment of V_1 speed. Nevertheless, it is undoubtedly true that there have been far more cases of false auto-featherings than there have been engine failures during the critical take-off period, just before and just after V_1 speed.

There are, though, two good things to be said in favor of automatic feathering: 1) In spite of sometimes feathering a good engine, at least it hasn't done so when another engine was malfunctioning as has been done by human pilots on occasion. However, this hazard can be minimized when it is realized that a thorough search of CAB accident reports for U. S. scheduled airlines for the past 14 years shows only three cases where forced landings have resulted because one engine was malfunctioning and the other was inadvertently feathered in the excitement of the moment. 2) Also in favor of automatic feathering is the fact that it has functioned successfully (as designed) at times and has feathered failed engine properly, quickly.

It was against this background of additional hazard introduced by the malfunctions of this complicated device and by the large increases in take-off gross weights which its adoption permitted, that the concept of substituting "automatic indication of power failure" was introduced as an agenda item at the Annual Airworthiness Review of the CAB Bureau of Safety Regulation in August 1951. Actually the idea was not basically new, a very similar one being mentioned in a Northwest Airlines report in 1947 which, after giving some reasons as to why automatic feathering was not desirable, said:

"*The hazard of inadvertently feathering the wrong propeller may be overcome by simply placing a torquemeter adjacent to its respective feathering button. . . . With the above outlined alternate feathering procedures, no reduction in operating gross weight should be considered providing torque-pressure indicators properly related to respective feathering buttons are installed and proper cockpit procedures adopted.*"

Inasmuch as the "automatic indication" idea was placed on the agenda for the 1951 Airworthiness Review as a last-minute item, many of the organizations represented there were unprepared to comment and as a result the CAB Bureau of Safety Regulation made it the subject of Draft Release No. 51-10:

"*Recent advances in airplane design have brought forth a new design practice with respect to the feathering of propellers, namely, the automatic indication of power failure. Under this system the pilot receives a visual warning when any individual engine loses power below a certain pre-determined value. Thus, with a definite indication as to which of the engines is in trouble, the pilot can take immediate action to feather the correct propeller.*

"*At the recently held annual airworthiness meeting representatives of certain airplane manufacturers suggested that the automatic indication of power failure, because of certain of its features, offers additional safety as compared to the automatic feathering. They recommended that consideration be given to a revision of the airworthiness requirements to permit the same increase in maximum take-off weight on airplanes equipped with an automatic indication of power failure as is permitted on airplanes equipped with automatic feathering means. Subsequent to the annual meeting the Air Transport Association indicated its support of this recommendation.*"

In order to adequately answer the questions raised by the draft release, the Air Line Pilots Association's Engineering and Air Safety Department did two things: 1) Polled all pilots who had experience with airplanes equipped with automatic feathering in order to determine their feelings in the matter, and 2) assigned the problem to the Engineering and Airworthiness Advisory Committee for study and recommendatoin.

The results of the pilot poll were given in a letter from the ALPA to the CAB Bureau of Safety Regulation, November 8, 1951, as follows:

"*The vote from the pilots was almost unanimous for the removal of auto-feathering as this device is considered dangerous and service experience bears out that it has actually added to the powerplant failure hazard during take-off.*"

Also attached to this letter were the recommendations and conclusions of the Engineering and Airworthiness Advisory Committee. In brief this report recommended the replacement of auto-feathering systems by auto-indicating systems with certain simple characteristics but with the following very important qualification as to weight and performance credit:

"*Should (by test) the incorporation of an Auto-indicating system and proper pilot schooling result in demonstrable reductions*

AIRPLANE	TYPE OF FEATHERING SYSTEM	PRESENT (MAX.) CERT. T/O WT.
Boeing 377	Auto Auto-Inop.	145,800 135,600
Convair 240	Auto	41,790
DC-3S	Auto Auto-Inop.	31,000 29,325
Martin 202	Auto Auto-Inop.	39,900 39,900
Martin 202A	Auto	43,000
Martin 404	Auto	43,650
CV-340	Auto	46,725
DC-6A DC-6B	Auto Auto-Inop.	107,000 103,000

Note that CAA has approved automatic feathering inoperative weights on only four transports: Boeing 377, Douglas DC-3S, DC-6A, DC-6B, and Martin 202.

in the time it requires for a pilot to recognize a malfunctioning engine and manually feather it, then it may be possible to apply such time saving to the performance data of the airplane so that a portion of the take-off path, after engine failure at V_1, would be computed with a windmilling propeller, while the remainder of the taffe-off path would be computed with a feathered propeller. Such computations could be utilized as the basis for balancing gross weight and runway length requirements against the 50-foot altitude requirement, which should always be maintained as the criterion of an airplane's take-off performance."

This report also pointed out that a closely interrelated item of take-off performance was adequate accountability for above-standard temperatures and humidities, the lack of which has been a matter of grave concern to the pilots for some time. On this point the report emphasized:

"RECOMMEND AGAIN THE INCLUSION OF FULL TEMPERATURE AND HUMIDITY ACCOUNTABILITY TO THE ENTIRE TAKE-OFF AND FLIGHT PATH AFTER ENGINE FAILURE AT THE V_1 POINT.

The entire concern of engine failure on take-off and direct cause to discard the inherently unreliable auto-feathering system is predicted on the inadequate one-engine inoperative rate of climb following engine failure on take-off during hot and humid weather. Auto-indication provisions like auto-feathering will not make for a complete safe flight path during adverse weather conditions.

The economics gained from auto-indication balance out safety only *when a complete engine failure during take-off during hot and humid weather can be coped with by a safe climbing flight until a landing on the airport is made."*

Finally, in conclusion, the report said:

"1. *Auto-feathering has proven to be subject to critical malfunction inherently due to its design.*
2. *In malfunctioning, the auto-feathering device has indirectly caused two accidents and several close calls.*
3. *Auto-feathering by malfunctioning has 'closed down' engines in proper running order.*
4. *Auto-feathering unnecessarily complicates our already too complex aircraft.*
5. *Auto-feathering by its very nature of being a* complicated *mechanical device, never can provide the equivalent safety provided by regulations that required a windmilling propeller climb demonstration.*
6. *Auto-Indication incorporated in a transport plane* conforming to the recommendations of this report, *can and will provide a greater level of safety than the auto-feathering system with its inherent mechanical features."*

There the matter stood with no further surface developments until the 1952 Airworthiness Review, when again the matter was brought up as a last-minute agenda item. This time there was a refinement of the idea from just "automatic indication" to "automatic selection" or "semi-automatic feathering." In the new proposal, instead of simply having power indicators adjacent to the proper feathering buttons or tell-tale lights within the buttons themselves, the system would be further set up so that after having been warned of a failing engine and having decided to feather, all that would remain for the pilot to do would be to close a master feathering switch and the proper engine would feather. This system, though more complex than the "automatic indication" one, is rather attractive in several respects:

1. If a false alarm should be given through malfunctioning of the device, the pilot has the opportunity of recognizing this fact through the behavior of his aircraft or through other instrumentation and deciding not to feather, an opportunity denied him now with automatic feathering.
2. The pilot is given the opportunity of trying partial throttle operation of a failing engine. It is well known that often an engine will deliver considerable power under part throttle but will refuse to run at all with full throttle. This advantage is also denied to a pilot with automatic feathering.
3. It has the advantage over "automatic indication" in that, in the case of an actual engine failure, it reduces further the possibility of feathering the wrong engine.
4. The system could apply to the whole regime of flight, from take-off to landing, whereas automatic feathering is limited to the critical take-off period only.

Again, as in 1951, due to the last minute nature of the item, most of the participants in the Review were unprepared to commit their organizations either for or against the proposals, although CAA personnel did indicate that they would not consider that full weight credit should be given. However, the indications were that the pilots, airlines, and manufacturers are in general agreement that 'semi-automatic feathering" would provide greater safety than is now given by automatic feathering, the only outstanding area of disagreement being the performance and weight credit to be allowed. This, of course, is a major point but probably not an insoluble one if, simultaneously, a real, sustained effort were made to settle rationally the temperature/humidity problem as it applies to our present-day aircraft. As it is now, we have excess performance on a cool day and submarginal performance on a hot day. It would appear that a leveling out of this performance to provide a more consistent safety margin regardless of temperature might, in fact, be to the airlines' benefit in that the resultant average gross weight might well rise slightly. At the same time a complete agreement could be reached on the substitution of "semi-automatic" feathering for the present unreliable automatic feathering with the attendant increase in safety pointed out by all analyses of the proposed system.

Navigation With Omni-Mag

(*Continued from page 21*)

response directly. Let us apply this principle to a specific case:

A VHF navigation system consists of a VHF navigation receiver and a glide slope receiver feeding signals to a cross-pointer deviation indicator, a marker beacon receiver operating its related indicator lights, and a remote compass system with related indicator—all indicators being mounted on the instrument panel. Since omnirange is in general use, the aforementioned VHF receiver would feed the vertical needle of the cross-pointer meter or a separate course deviation indicator. In either case, a manual course selector and a To-From sense indicator would be mounted on the instrument panel, or nearby. In addition, each receiver would have its controls placed on a control panel on the pedestal or overhead.

Pilot attention is required to tune the receivers to their proper operating frequencies, to set in the proper omni course selection, to monitor the course indicator and sense indicator, and to maneuver the airplane to the desired omni radial. Since the omni range is a position device—indication for a given geographic position is the same regardless of heading—it is necessary to refer to the compass indicator for magnetic bearing. A quick calculation then gives relative bearing or heading to the omni station. Interception of localizer beam requires that the pilot monitor the vertical needle of the cross-pointer meter, again with reference to the compass indicator for heading or magnetic bearing. Passage over the marker facilities gives operation of the marker beacon lights. Interception of the glide slope beam necessitates attention to the horizonal needle of the cross-pointer meter. A considerable burden is involved in monitoring the several indicators, in operating controls at their various location, and in flying the airplane according to attitude instrument indications.

VHF Navigation

A typical VHF navigation system is designed to allow the pilot utilization of all airway navigation, instrument landing, and communications facilities currently available between 108 mc. and 135.9 mc. A block diagram of such a system is shown in Fig. 1.

Navigation information is presented to the pilot in several forms. Basically, the presentation is a "cross-pointer" instrument in which a vertical pointer is at center when the aircraft is directly on the desired course. This course may be the track of a runway localized (ILS), a leg of a "visual-aural range" (VAR), or a radial of a visual omni range (VOR) selected with the omni-bearing selector (OBS). The aircraft is maintained on the desired course by steering left or right of the approximate magnetic heading as required to keep the vertical pointer centered.

It will be noted from the foregoing that the basic VOR instrumentation requires visual reference to a magnetic reading indicator, an omni-bearing selector, and cross-pointer instrument. Orientation of the aircraft with this arrangement requires mental correlation of the three instruments.

This problem has been highly simplified with the introduction of the Bendix Omni-Mag (*see Figure 2*), an instrument which combines ILS cross-pointer (deviation), omni-bearing course selector (with To-From indication), marker beacon indicator, and magnetic heading indicator—all four being mounted within the panel space required by a single standard instrument! The Omni-Mag presents a "picture" of the relationship between location of the desired course line and the aircraft heading, which minimizes the mathematics attendant to the problem of orientation or of following a course.

Pilot attention to this one instrument, therefore, will fulfill all functions obtained by reference to the several indicators which it replaces.

Bendix Omni-Mag

The Bendix Omni-Mag (*page 19*) consists of a single instrument mounted on the instrument panel and electrically connected with its associated equipment in the exact manner as the individual instruments which it replaces—there are no electronic tricks or extra "black boxes" to buy and to maintain.

In considering an investment in the Omni-Mag, it is pertinent to note that this new unit eliminates the requirement for the "standard" omni-bearing selector and the cross-pointer indicator plus possibly a compass repeater indicator. When contemplating revision of an existing VHF navigation system, this means a net gain in available panel space. Planning a new installation obviates purchase of the items not needed.

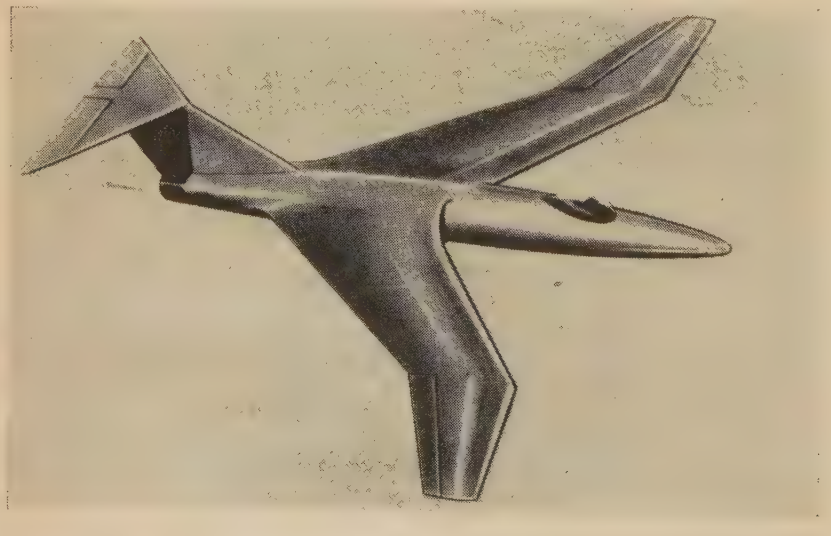
A face view of the Omni-Mag is shown on page 19. Reference to it will help in visualizing its operation.

The cross-pointer display differs from the normal presentation by reason that the vertical pointer remains vertical as it moves from left to right (on course at center), and the glide-slope pointer remains horizontal throughout its travel. In other words, the vertical and the horizontal pointers are pivoted so that they move linearly, as on the Sperry Zero Reader, instead of being pivoted at one end as in the conventional cross-pointer indicator. Moving in this manner, the vertical pointer may be visualized more easily as the track or course selected. As usual, the vertical pointer is associated with a VHF navigation-communications receiver (hereinafter referred to as a VHF receiver), and the horizontal pointer is associated with a glide-slope receiver. Flag alarms are included for both pointers.

Upon selection of a VHF omni range frequency on the control panel, any desired course to or from the omni station is selected by rotating the Course Set Knob at lower left on the instrument until the selected course is indicated by figures in upper center, designated Selected Course Indicator. Whether this bearing is "To" or "From" the station is automatically shown by "To" or "From" appearing in the small window at upper left. When you are on this selected course, the vertical (deviation) pointer is in center; when the course is to your right, the vertical pointer is to your right; and when the course is to your left, the deviation pointer is to your right.

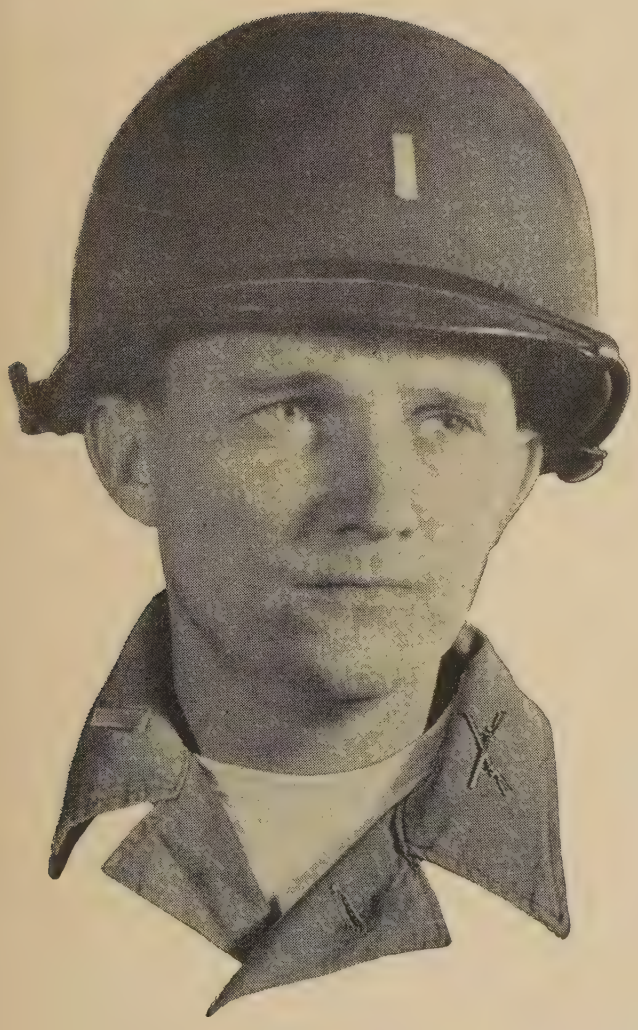
Upon selection of a VHF localizer frequency on the control panel, the exact same indications are shown, except that there is no necessity for selecting the localizer course as this is fixed. However, it is well to note

(*Continued on page 52*)



CRESCENT WING *is latest "answer" to problems of supersonic flight, according to British. The Crescent is designed to take advantage of best features of three types built for piercing sound barrier: delta, sweptback wing, razor-thin straight wing; is claimed to give excellent control, to insure no ill-effects to aircraft as it meets sound barrier*

1st Lieutenant Lloyd L. Burke
U. S. Army
Medal of Honor



THE RED KOREAN strongpoint had stalled our attack; Lieutenant Burke saw that a breakthrough must be made. Rallying 35 men, he crept close to the enemy bunkers. He laid down a grenade barrage. Then he ran forward to an

exposed knoll and opened a one-man pitched battle. He turned a light machine gun into the Red position. He caught live enemy grenades in mid-air and threw them back. Once he killed three men with his pistol. Before sunset Lieutenant Burke and 35 men had defeated 300. The lieutenant says:

"Every day, men who fought in Korea are coming home. They're finding jobs—partly because they and you and I own nearly 50 billion dollars' worth of Defense Bonds. For Bond savings—which protect our own families—are also building a great backlog of *national* prosperity. Reason enough for investing in Bonds—don't you agree?"

★ ★ ★

Now E Bonds earn more! 1) All Series E Bonds bought after May 1, 1952 average 3% interest, compounded semiannually! Interest now starts after 6 months and is higher in the early years. 2) *All maturing E Bonds* automatically go on earning *after maturity*—and at the new higher interest! Today, start investing in better-paying Series E Bonds through the Payroll Savings Plan.

Peace is for the strong! For peace and prosperity save with U.S. Defense Bonds!

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Navigation With Omni-Mag

(*Continued from page 50*)

that when a relative heading pointer is used, the localizer course should be selected just as an omni course is selected.

Aircraft heading is visually presented to the pilot in the form of a center-pivoted pointer, the tip of which represents the aircraft nose. The relative heading pointer is fed by a gyro-stabilized magnetic compass and operates in conjunction with the course selector so that the pointer indicates your heading relative to the selected course in degrees right or left. If you are headed in the direction of the selected course, it points straight up and if you are headed within 45° right or left of this course, it so reads. If you are headed in the opposite direction from the selected course, this pointer points downward and any heading 45° left or right is shown. Without resorting to calculation of navigation angles, it is easy to fly toward or away from the desired course line at the desired angle by simply treating the vertical pointer as the desired course line and the tip of the relative heading pointer as the nose of the aircraft.

This relative heading pointer is the secret of success in flying "to" and following a given course. It assists you to visualize the turn you must make and shows you the proper rate of turn for approaching and arriving on course without estimating rate of approach and bracketing.

The marker beacon lamp at upper right on the instrument is associated with a marker beacon receiver for use with a single-light system. The lamp housing is not an integral part of the Omni-Mag and so the three-light type of marker beacon indication may be retained if already installed at another location on the panel.

Installation

Physically, the Omni-Mag mounts in a standard 3-inch panel cutout. Over-all dimensions are 3.25 inches by 3.25 inches by 7 inches deep. Weight is 3 lbs. 4 oz.

Electrical power requirements are 28 volts, direct current, and 26 volts, single-phase, 400 cycles alternating current. Current drain is negligible. Electrical circuitry comprises VHF receiver output and flag alarm, glide-slope receiver output and flag alarm, VHF receiver course selection, to-from indication, remote-indicating magnetic compass output, and marker beacon lamp.

When planning to revise an existing VHF navigation system to include an Omni-Mag, it is advisable to obtain the assistance of a qualified aircraft radio engineer or of the manufacturer.

While the Omni-Mag is compatible with necessary associated equipments of standard manufacture, it is well to analyze existing circuitry and interconnecting wiring in order to effect a neat, efficient installation according to standard aircraft practice. This advice is equally applicable when planning a new navigation system incorporating the Omni-Mag because engineering planning in the full sense of the term is mandatory when dealing with equipments directly concerned with safety and reliability of flight. Complexity of modern aircraft instrumentation and high performance standards imposed by instrument flight require that planning, installation, and maintenance be accomplished by engineers and technicians having proper equipment and trained in its use.

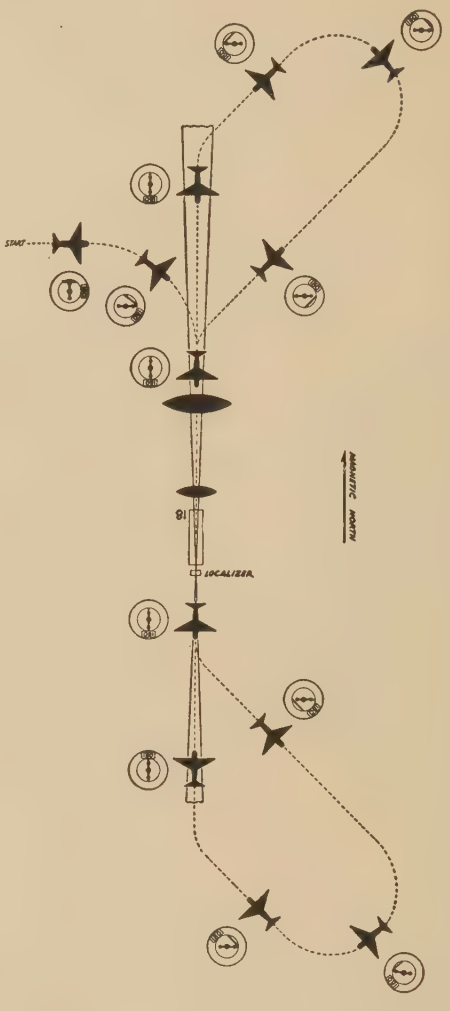


FIG. 5—*Diagram shows complete Inbound and Outbound operation of Omni-Mag on the Localizer of Instrument landing System (ILS)*

Flight Operation

For purpose of describing use of the Omni-Mag in flight, we shall assume that an installation has been made similar to that shown in *Figure 2*. Further, we shall assume that all associated navigation equipment is in operation, and that we wish to fly omni-range from Baltimore to Harrisburg, for example.

Shortly after take-off at Baltimore, a flick of the frequency selector knob tunes the VHF receiver to 112.8 mc, the omni station at Harrisburg, and aural identification is obtained. At 3,000 feet we note that the Omni-Mag vertical pointer flag alarm has disappeared, indicating an adequate signal. We know that our magnetic course from Baltimore to Harrisburg as plotted on the map is 352°. Accordingly, we set the bearing as read on the selected course indicator by rotating the course selector knob at the lower left. The word "To" automatically appears in the To-From indicator window at the upper left of the Omni-Mag to show that we are heading toward the station.

At the moment we are flying a heading about 20° west of north, which fact is immediately apparent by the position of the relative heading pointer. This indicates how our airplane is headed relative to the course we have selected. The vertical or course pointer has moved over to the right. This tells us that our course is to our right and that we must move to the right in order to approach the desired course. The vertical pointer may be visualized as the straight line between the two omni stations drawn on the map and is the course we wish to fly. This is graphically illustrated in *Figure 3* on page 20 and an Omni-Mag indication of our present situation is shown in Step 1 of this illustration.

Knowing that we must head to the right, we start a turn in that direction and continue this turn until the tip of the small relative heading pointer apparently touches the vertical pointer (*Step 2 of Figure 3*). We know now that we are approaching our selected course at the proper rate and as the vertical pointer begins to move toward the center, we start turning to the left at the proper rate to keep the two pointers aligned. This means that we will make an asymptotic approach (an ever-decreasing curve) to the course. We are on our course very quickly (*as denoted by indication as seen in Step 3 of Figure 3*). There is very little wind so that the two pointers remain aligned and we remain on course without any further bracketing or effort until we reach Harrisburg omni station.

Upon passing the station and continuing on the same course, the vertical pointer and relative heading pointer will show on-course and will have the same sensing as when we are approaching the station; but the automatic appearance of the word "From" in the To-From indicator window shows that we are heading away from the station on the selected course.

For long flights on which a desired magnetic track is to be held for some time, we would set the course as read on the selected course indicator by rotating the course selector knob. Airplane heading is then controlled to maintain the relative heading pointer on zero in the upper half of the Omni-Mag; there is no need to do any arithmetic—adding or subtracting headings to find out our True Course.

Localizer Approach

Convenience and downright simplification of procedure are clearly demonstrated when working out an approach problem with Omni-Mag. For purpose of description, we shall assume that we are headed west and that our geographic position is north of our selected runway course and that we are

east-northeast of the localizer station. In actual practice, we would probably fly an omni course until interception of the localizer beam was obtained. The conditions cited herein will be adequate for purpose of illustration, however.

As before, all associated equipment is in operation and a flick of the frequency selector knob tunes the VHF receiver to localizer and, if not accomplished simultaneously, the correct glide-slope frequency is selected on the glide-slope receiver. A glance at the chart shows runway magnetic bearing to be 250°. This bearing is set as read on the selected course indicator by rotating the course selector knob. The To-From indicator is inoperative when flying localizer. Disappearance of the vertical pointer flag alarm indicates an adequate localizer signal.

Omni-Mag indication is now obtained (*as shown at Step 1 of Figure 4*). The relative heading pointer indicates that our present heading is 20° to the right of our selected course, and the vertical pointer has moved to the left to tell us that our course is to our left. Remember, you visualize the aircraft and yourself at the circle in the center with the vertical sliding bar as the ILS runway (or a track to or from the omnirange) and the free end of the "pivoted" relative heading pointer as the nose of the airplane. Omni-Mag navigation may truly be called "flying by picture" because of such similarity between what is seen through the windshield VFR and what is seen in the Omni-Mag.

We start a turn to the left and continue the turn until the tip of the relative heading pointer apparently touches the vertical pointer (*Step 2 of Figure 4*). We are now heading toward our selected course at an angle of 45° and the turn is held until the vertical pointer starts to move toward center. Now the left turn is backed off and right turn is applied to keep the two pointers aligned (*Step 3 of Figure 4*). Ou rtrack to beam center will be the desired asymptotic approach.

The right turn is reduced until con-course indication at beam center is obtained (*as shown at Step 4 of Figure 4*), providing there is no crosswind. If a crosswind exists, it will be found that to achieve or to maintain centering of the vertical pointer (often called "runway bar" when flying localizer) will require holding the nose at some drift angle to the runway. The picture in the Omni-Mag would be that seen through the windshield if flying VFR (*Step 5 of Figure 4*).

Any change of crosswind during the approach becomes apparent by movement of the vertical pointer away from the center. The pilot corrects for this with little mental effort by promptly turning the nose pointer toward the vertical pointer long enough and steeply enough to regain a position on the runway course. The airplane is then turned to a new crab angle and the new Omni-Mag picture is held so long as the airplane remains nicely on the runway course. In this way, the current drift angle is automatically presented throughout the flight.

Position along the runway course is checked by outer marker beacon indication. Altitude, power setting, wing flaps, and landing gear are applied according to current procedures. Disappearance of the horizontal (glide-slope) pointer flag alarm indicates an adequate glide-slope signal. The use of the horizontal pointer for glide-slope tracking is conventional. Inner marker beacon indication provides a further check of distance to the runway and we soon slip across the boundary for a successful touchdown.

In event that it is necessary for a "go-around," the pilot will go into climb while holding present course and continuing to use Omni-Mag for guidance. Upon passing the localizer station, the aircraft is flying the "outbound" leg of the localizer. The sensing of the vertical pointer remains the same as long as the aircraft continues on the heading set in the course selector window. After making a procedure turn (*as shown in Figure 6*), and heading back toward the localizer in the opposite direction, the sensing of the vertical pointer is reversed. The Omni-Mag greatly assists in avoiding confusion since it is only necessary to remember that at any time the "nose" pointer is held toward the vertical pointer in either the upper or lower half of the Omni-Mag, the nose of the airplane is pointed toward the runway line. At any time the "nose" pointer is held toward the vertical pointer in the lower half of the Omni-Mag, the airplane nose is pointed toward the runway line on the reverse of the approach course set up on the course selector.

Since the presence of the "nose" pointer in the lower half is a reminder that the "reverse" course is being flown, experienced ILS pilots usually find no difficulty in remembering the reversal of vertical pointer sensing (pointer to left means runway line actually to right) and find little inclination to turn in the wrong direction for a given correction.

Most pilots who have not been thoroughly familiar with ILS have had little trouble with "reverse" course flying by simply remembering that, regardless of the direction they are heading, if they want to intercept the runway line they turn the "nose" pointer toward the vertical pointer. This always holds true, whether inbound, outbound, or "just plain lost" and beginning an orientation procedure. Others find no trouble in proper turning by visualizing themselves as sitting on the "nose" pointer pivot at all times. Still others visualize the "nose" pointer as being mounted right in the center of their control wheel and have no trouble in turning in the proper direction at all times to make any correction that appears necessary in the Omni-Mag ture. If this seems complicated, it shou realized that actually, the Omni-Mag is stantially reducing the basic problem e enced in earlier instrumentation.

Certainly many ideas for the easy a plishment of various navigation problem grow out of general use of the Omni-M is the intent of this article to presen the highlights leading to understandi typical indications. Figure 5 furnishes gram of inbound and outbound operat the localizer of an ILS system.

Business Pilot

(*Continued from page 27*)

boss' case and helps settle him in his seat.

From take-off to landing, it's strictly routine as far as the pilot's concerned. He tools his winged hotel suite through the sky, reading the VOR, ADF, and Omni or he flips the whole thing onto autopilot. He flies contented, for he likes the set-up of the cockpit—he helped design it when the plane was modified.

Meanwhile, the copilot checks range frequencies, beam headings, and ETA's. Or he's "on duty" in the cabin, serving coffee or cold drinks to his passengers.

Back at the home base, when the pilots are not on call, they sweat over maintenance. In most operations, the pilot is in charge of keeping his plane in shape. There may be one mechanic as well as copilot for each plane in the stable, but the pilot makes the wheels go when the 100-hour check is due.

In some operations, the pilot merely supervises. He sees to it that the copilot and mechanics of the service operator who is hangaring the plane, get the job done. But it is in maintenance where the pilots of the business fleet are making their biggest push to prove that business flying can pay its way in both good times and bad. So, more and more, the pilots are taking over all maintenance except major overhauls.

To meet the challenge of rising costs, there's a tightening up in the executive aircraft field, a growing seriousness of purpose as the tax structure grows less favorable to corporations and as parts get more scarce. And the pilots are leading the fight.

Perhaps Bud Clark, copilot of the Cluett-Peabody *Lodestar*, put it best when he said, "If we can prove to the boss that our operation is not only safe but economical, we've got a better chance." His words are a good indication that the pilots of the business fleet are hard-headed about their jobs. They portend a sounder development for the still-expanding executive aircraft industry.

Clark believes that, as in any fairly autonomous operation like business flying, the future depends on the guy running it. Any pilot can plead safety and load up his plane with every gadget that clutters the market. But the smart pilot today is balancing outgo against income—both present and potential.

For example, Clark himself, when his *Lodestar* recently came up for relicensing, supervised every angle of the job, including [illegible] Bill Madaris, Lee [illegible] was a ting "down" time by keeping a spare engine on hand and building it up himself with reconditioned accessories rather than sending it out. His overhauls now take only four days where they once took two or three weeks.

Bob Smith and Artie Schweit of the Kudner Agency are cutting "down" time on trips by carrying over 300 pounds of spare parts in the aft end of their converted DC-3. Smith and Schweit can jump into coveralls at any airport, with or without facilities, and install reconditioned starters, generators, oil coolers, or vacuum pumps, if need be.

But one of the most significant trends in the new swing toward economy and efficiency in the business fleet is the tendency to standardize. One indication is the production by Mallard Industries of Bridgeport, Conn., of standardized DC-3 conversions for the executive-aircraft field. From its long experience as a modifier, Mallard has drawn up plans that include the most popular features asked for by its customers and is turning out, according to these plans, eight DC-3's that it recently bought from Eastern airlines. Of course, some changes can be made, but the tendency toward standardization to cut costs all around is there.

SAFETY!

It's twice as safe to fly as it is to drive! According to statistics, in latest one-year period, there were 2.4 deaths per 100 million passenger miles in automobiles; and 0.38 per 100 million passenger miles flown by U.S. scheduled airlines.

Another indication of the trend toward standardization is the plan of five big corporations to pool their planes, personnel, and sources of supply. In other words, to combine all five flight operations under one roof.

There already has been extensive informal combining in equipment. Two companies at Westchester County Airport today jointly own a heater and battery charger. And with spare parts common to all DC-3's, there has been borrowing and exchanging ever since the operations began.

But under the new plan, the entire roster of pilots will be "on call" to all companies. All planes will be available at all times and there will be a huge staff of mechanics on hand. Advantages to both the companies and their personnel are obvious. Greater flexibility of operation will mean savings to the com- y. And that flexibility will mean more e off for the crews.

'he big advantages, however, come in the s buying power that the companies will y. Fleet rates on gas, oil, and parts will ail. And since all five companies won't to stock their own parts, there will be er inventories and smaller stock rooms. rdization can pay off.

he pilots have opened the door to ;y and efficiency in business flying. But .e bosses who are helping them through that door. As aviation itself settles down and matures, businessmen are looking at it as a legitimate and indispensable tool of business.

As a result, business flying in general and pilots in particular enjoy a pleasant payoff. A payoff in long-term advantages for everybody in the form of training programs and retirement and insurance plans.

Take the training program of Sinclair Refining Co., for example. At Sinclair, which has a fleet of 20 airplanes and a huge central shop at Tulsa employing 49 mechanics, training for the pilot, regardless of ratings and previous experience, begins in the shop. Here, the pilot learns the company's maintenance policy and studies aircraft, radio, etc.

From the shop, when there's a pilot opening, the most likely candidate is chosen for training in Cessna 140's which are used for pipeline patrol, the Beechcraft *Bonanzas* which carry passengers, and finally in right-side Beechcraft D18S work. Graduation to left-side, all-weather flying comes only after long and continuous training.

Sinclair also has a definite retirement plan for its pilots. Pilots retire at 50 and go to a desk job until they are 65. And all during their tenure, they get a packaged insurance policy free of charge.

But probably the biggest and most important indication that executive aircraft flying has come of age is the tremendous success of Flight Safety, Inc., a school established primarily to train pilots of executive aircraft, although pilots for government agencies and airlines have also been trained.

Flight Safety, Inc. is dedicated to "keeping pilots currently informed and to promoting teamwork in the cockpit." To date, the company has followed that policy with pilots for Eastman Kodak, National Distillers Products Corp., Icelandic Airlines, Food Machinery and Chemical Corp., Cornell Dubilier, National Dairies, Brewster Construction Co., etc.

Capt. Al Ueltschi, President of Flight Safety, Inc., himself a corporation pilot, and Capt. J. D. O'Neal, of the airlines, believe that their program and their approach to the problem of safety are sound for well-informed and highly trained pilots functioning as a well-oiled machine, and can stop many would-be accidents before they can happen.

A high degree of proficiency is needed in any flying operation, and Flight Safety, Inc. is selling it. In a program that takes but a few days, using the corporation's own plane and training the pilot and copilot side by side, the Flight Safety staff prepares a flight manual and check list based on operational experience and manufacturer's specs.

Flight Safety, Inc., stresses that it is *not* checking pilots. It is training them. Its object is to work out procedures with the pilot and his copilot for safe operation of the company plane. It's a complex training program for a complex industry, and its most enthusiastic supporters are the participating pilots and the corporations themselves. Aviation Insurance Underwriters, and CAA and CAB have endorsed this plan which places business flying on the same proficiency basis as that required of airline pilots.

Operation Fox Peter One

(*Continued from page 18*)

the jet jockeys could top their tanks if they wanted to, further assurance of a safe trip into Hickam AFB. However, only a few of the aircraft took on additional fuel at this second refueling point. Sixty-one *Thunderjets* left California and only two turned back, both because of minor difficulties.

Col. Schilling knew he had the project licked when the planes arrived at Hawaii without anybody ditching in the blue Pacific. It was a 2400-mile leg—almost twice as far as any of the remaining island-hopping distances and the only over-water leg on which in-flight refueling was considered necessary.

The in-flight refueling technique for fighters has been perfected to such a high degree now that it only requires a contact of a few minutes to be "filled up" in the air.

All of the 31st FEW pilots flew the Pacific in survival suits borrowed from the Navy. The survival suit is a close-fitting water-proof rubber outfit, complete with rubber shoes. A Mae West life vest, shark repellent and small life rafts were "must" equipment.

On July 10, the entire Wing hopped to Midway Island, making the 1,141-mile hop in two hours and 55 minutes. A great deal of concern was expressed by Air Force officials at Hickam over the presence of thousands of "gooney" birds, terns and albatrosses which populate Midway. They feared the birds would be sucked into the air scoops of the jets and cause severe damage. The birds were out in full force and did cause concern, but no damage.

The wing departed Midway on July 11 and zoomed to Wake Island—a distance of 1,030 miles—in one hour and 55 minutes. Two ships had "gooney" birds pass through their air scoops on take-off, but there was no damage to the planes.

Refueling at Wake impressed Col. Schilling and his pilots since Pan-American employees were eager to assist regular Air Force refueling crews. The wing did not remain overnight at Wake, but pushed on to Eniwetok Atoll, covering the scant 536 miles in one hour and 10 minutes.

From a ground crew standpoint, the highlight of the deployment came when the jets left Eniwetok. The runways were too short for a safe take-off, so it was necessary to employ JATO (jet assist take-off). Two JATO bottles were attached under the fuselage of each jet fighter, each bottle containing a substantial charge of rocket propellant.

After rolling down the runway at a good speed from the thrust of their own engines, the *Thunderjets* left the ground with a Fourth of July effect when the pilots touched a firing switch in the cockpit that cut loose 2,000 extra pounds of thrust from the JATO.

The flight from Eniwetok to Guam, a distance of 1,066 miles, required three hours and eight minutes. This flight took longer because turbulence forced the pilots to throttle back.

At Guam, there was a lay-over of one day to rest the pilots and ground crews. Chief concern throughout the mission was the physical strain on the maintenance crews. They would work all day on their aircraft and then board a transport to follow the jets to their next stop and perform more maintenance. All came through in fine shape.

Fifty-nine *Thunderjets* roared off the Guam runway on July 15 and headed for Iwo Jima, but only 58 planes landed at the destination. Their one loss: Lt. Col. Elmer G. DaRosa, of Sacramento, California, was killed when his plane crashed as a result of an explosion in the engine compartment as it was coming in to land at Iwo Jima.

The last leg—a 650-mile hop into Japan—took only one hour and 56 minutes and was completed on July 16. General Otto P. Weyland, Commanding General of the Far East Air Force, was at Yokota AFB to greet Col. Schilling and his pilots as was Brigadier General Delmar T. Spivey, Commanding General of the Japan Air Defense Force, under whose command the 31st Fighter-Escort Wing will serve while on duty in the Far East.

(*Continued on page 56*)

SUCCESSFUL FIRST FLIGHT *recently was made by Super Constellation powered by compound engines. Compound-powered Connie is in production for Navy, airlines*

Operation Fox Peter One

(*Continued from page 55*)

Many of the 31st FEW pilots were returning to familiar territory since more than half were veterans of the air war over Korea.

For the entire flight from Albany, Georgia to Japan, the average flight time per plane was slightly less than 29 hours.

Col. Schilling predicted that the next trans-Pacific jet mission would go across in less than a week by utilizing the information compiled by the 31st on this first trip.

Before the 31st blazed the sky trail to the Far East, all fighter-type aircraft were moved into the Pacific by loading them aboard aircraft carriers and cargo ships. The 31st got its jet fighters from Georgia to Japan in 11 days and the planes arrived in combat condition.

Col. Schilling described "Fox Peter One" as an "all-service show" which ranks with the greatest demonstrations of inter-service cooperation in recent years.

Aircraft from four SAC aerial refueling squadrons participated in the operation in order to spread the experience around as much as possible. These squadrons furnished Boeing KB-29's and KB-97's for air refuelings over Texas and on the California-to-Hawaii leg.

SAC RB-36's flew weather reconnaissance across the Pacific.

Military Air Transport Service airlifted spare engines, parts and personnel to Japan.

Air Force Air Rescue Service and MATS had rescue planes patrolling the Pacific on the route from California to Japan.

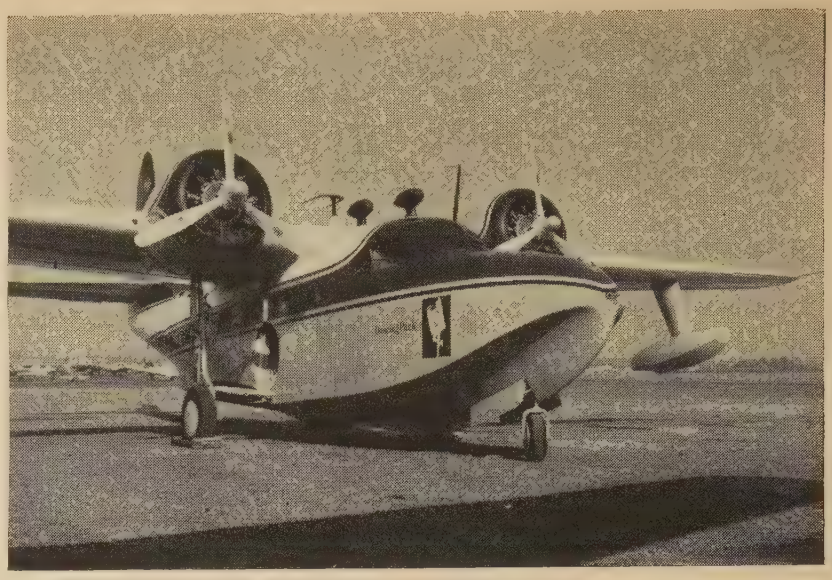
The Navy also provided search and rescue planes as well as surface vessels along the route. Navy personnel at Midway Island worked side-by-side with 31st men to refuel the *Thunderjets* and even swept the runway there to keep excessive coral dust from getting into air scoops.

The Marines helped out at Midway by furnishing guards for the supply planes. The Coast Guard had surface vessels available in case some planes had to ditch, and Pan-American personnel helped refuel at Wake.

The Air Force and Strategic Air Command learned much about the swift deployment of a fighter wing from "Fox Peter One." An interesting conclusion from the movement was that the machine had been developed to a point where it exceeded the limit of comfortable human endurance.

All pilots agreed that automatic pilots are a "must" on the long, over-water hops and all suggested the pulsating seat is a definite requirement for every flight of more than three and a half hours. This information, along with maintenance and refueling data compiled, will enable the next deployment to be even more efficient.

The most important aspect of "Fox Peter One" was that a major obstacle to the advancement of military aviation had been overcome. No longer would the deployment of 600 mile-per-hour fighters be limited to the speed of surface ships!



GRUMMAN MALLARD *is owned and operated by P. Lorillard Co., makers of Old Gold cigarettes, as an executive transport; formerly was owned and flown by General Foods*

Corporate Flight Base

(*Continued from page 29*)

airport, goes largely to Chief Pilot Sam Willis, commander of the fleet and skipper of the DC-3, and to Chief Mechanic William Linn. During the renovation of the 14,880 square feet of space leased them by SAC, they and the 12 pilots, three mechanics, and two porters based with them, "doubled in brass" as carpenters, brick layers, painters, and grader-operators.

Their conversion of the hangar didn't interfere with their flying. Patrols were and are made regularly and, according to schedule, executive planes stand ready to go for specific flights. To avoid any work being done on a plane in the presence of passengers, aircraft are set to go 30 minutes before scheduled trips. Work on the hangar itself has been done at odd times and outside the regular work schedules.

The lounge, where pilots make out their reports and passengers await take-off time, would make an ideal den in any modern home. One wall is covered by a detailed and colorful air map of the United States. Against the north wall, where the outside entrance to the room is located, hangs a wide and brightly decorated drape. Next to the drape, is a desk of modern design. Grouped around the room are sectional pieces of furniture covered in a variety of fabrics and colors. The variety has unity to it and is designed to suit any taste.

A piece of modern art hangs on the south wall and across the east wall a few birds seem to take flight. Magazines and books are arranged on the coffee and corner tables. Just off the lounge, in an entryway, is a large closet where guest may leave coats, packages and other articles they find they don't need on a trip. The two offices opening into a hallway separate the lounge and the maintenance shop. All machines in the maintenance shop are painted red and grey to carry out the company color scheme.

To protect the dark grey floor from flying sparks, the men are placing red bricks in one part of the maintenance room as a base for the welding table. Many planning hours were spent in determining where to place the machines to afford best working conditions.

Parts are usually located by numbers—frequently a lengthy and puzzling process. Magnolia's maintenance men decided the fastest way to find a part was to place a sample on the outside of each box. This simple change has increased efficiency, they report.

Cabinets, cleaning vats, shelves, and other built-in conveniences were worked out on paper and then executed by the men themselves.

The hangar itself is kept clean and free from odds and ends left strewn about. Everything has its place and is kept there, even down to the smallest dust cloth.

To give the place a pleasing appearance outside as well as inside, the Magnolia men built a white picket fence about their automobile parking area, had concrete walks poured and even built a walled flower bed. One of the porters, who reputedly has "a green thumb," keeps the flowers.

Mechanics and pilots alike have even turned sign painters to label everything from the lounge to the parts room.

Fluorescent and indirect lighting in the offices and lounge was worked out by Southwest's maintenance chief, W. C. Fenner. Through watching Fenner work, Linn even got ideas for lighting the map in the lounge.

In reviewing the pipeline patrolers' million-mile record, Willis points out there are six pilots for the four planes, thus insuring

that those on duty are rested, well, and ready to fly. Planes are kept ready by four mechanics who work according to an exact schedule, servicing and checking the planes at regular intervals.

For major overhaul or special work needed, Magnolia's planes are provided for by the adjacent shops of Southwest Airmotive.

Although Magnolia's flying operation has only been working for six years, Willis first sparked the idea in 1933 when, like many other pilots, he was having trouble making ends meet. He owned his own plane but could find little work. He spent more money than he made barnstorming. He went to Magnolia with an idea for air pipeline patrol, but officials told him they weren't ready. It took valuable time and unnecessary money for the men who walked the lines with a few small tools looking for trouble on the lines, but the company knew it could rely on the results.

On the chance that the company would change its mind, Willis took a job driving a truck for Magnolia. One weekend, Willis unwittingly took several Magnolia officials up in his old personal plane for a tour over part of the company's pipeline. It wasn't until after the men landed, unnerved by the rough ride, eyes burning from the wind, and clothes oil streaked and dusty, that he learned their identity. He realized it would be years before the company could believe that anyone could spot pipeline trouble from a plane.

Willis took a leave of absence from Magnolia to fly for an oil company in East Texas. When war began in 1941, he volunteered his services. For six weeks, he was a civilian pilot for the Air Force. Then, at Hensley Field in Dallas, he took a nine-day course with a group of other pilots and became a commissioned officer assigned to ferrying duty. He later flew the first cargo run from Los Angeles to Dallas for the 5th Ferrying Group of ATC at Love Field.

When he received his release from the service, Willis went by Magnolia's offices in downtown Dallas. The company was sold on starting an air pipeline patrol and Willis was hired as its first pilot.

The first plane, bought in 1946, was used for executive flights, since the company's need to keep business appointments in various parts of the country was most pressing.

Shortly after Willis started flying for Magnolia, he hired Bill Linn as mechanic. Any place that Linn found to park his tool box was home port for the two men—a far cry from their deluxe quarters of today.

Men of the "Red Horse Air Force" have a strict rule: Although some of the mechanics are qualified pilots, and some of the pilots are qualified mechanics, they never overlap their work. Pilots stick strictly to flying and mechanics take care of maintenance. There, the division of work stops. When it came to fixing up the SAC hangar, all of the men, including two porters, pitched in with suggestions and brawn to complete a task of which each is justly proud.

Pilot's Report—Zero Reader

(*Continued from page 13*)

the needle is left of the little airplane on the ILS dial and "in the Blue," which is shown on the cockpit instrument to the left of center. Hence, you fly left, or towards the needle, or the course is on your left; or however you prefer to consider it, and the needle moves toward center where you want it.

You will also remember that flying the back course, the instrument only knows that you are in the Blue or Yellow hemisphere; and if in the Blue hemisphere, you are left of course, and flying left or towards the needle going further left. Good Localizer flying is usually the result of the ability of the pilot to think always in terms of the hemisphere or airspace on either side of the approach and flying headings rather than "chasing the needle," but nevertheless, back course flying requires considerable mental discipline on the part of the pilot.

So what did Sperry do to make it easier? On the Selector Switch, the four positions read "*Blue Left*", "*Flight Instruments*", "*VOR-Localizer Blue Right*" and "*Approach*". The second and fourth we have spoken of and should be self-explanatory. The third we spoke of as "*Localizer*" and it should be noted that it also says "*Blue Right*" which is where the Blue hemisphere is on every ILS front course. Now, the first position, or "*Blue Left,*" should be readily recognized as the orientation of the two hemispheres when the course is being flown.

With that information, Ed turned the switch to the Blue Left. Again, all I did was to keep the two Zero Reader cross bars "zeroed" and out we went on initial outbound heading. In a later back course approach to La Guardia to return two of our passengers, it brought us over the Localizer house like a homing pigeon.

Being of an indolent turn of mind, I was not reluctant when Ed suggested, after the eighth approach and almost two hours of such flying, that we take a rest. How mistaken I was! He meant turning the rest of the flight over to the Gyro Pilot and Approach Coupler. Even a short respite from precision flying was not in the offing.

A-12 with Approach Coupler

Back out we went to Idlewild, and now Ed engaged the Gyro Pilot. Automatic ILS approaches have been described before and de-

(*Continued on page 58*)

Pilot's Report—Zero Reader

(*Continued from page 57*)

serve a story all on their own, but briefly it can be said here that I have never met a pilot, airline or not, who, having once thoroughly familiarized himself with such a means of making a low instrument approach, has not said "Brother, that's for me, from here on out!"

It is amazing how much coverage of the vital details of airplane and engine operation, approach navigation and attention to procedure can be accomplished with relaxed confidence during an IFR approach using the Automatic Approach Coupler.

I am sure that experienced pilots, regularly using this equipment, find an occasional instance when their judgment dictates shutting it off, or taking over manually; that is possible by slight pressure on a button on the control wheel. For myself, in view of the fact that, like a manually flown ILS approach, the Approach Coupler "prefers" to tie the course down well in advance of the Outer Marker (being limited in degrees of bank to prevent over-banking of the aircraft in event of a too sharp intersection of the course), I would prefer the manually-flown Zero Reader approach or intersection for a real close-in deal and then engage the Gyro Pilot and Approach Coupler upon contact with the glide slope.

Ed and George were naturally full of statistics showing that actual weather demonstrations flown during conditions *below* airline minimums indicated that at 400-ft. ceiling and ¾-mile visibility (common average ILS minimums) use of the Zero Reader and Approach Coupler could have eliminated the 9% of DC-3, 14% of Convair, and 19% of four-engine missed approaches evaluated over a period of 28,000 IFR actual approaches, of which about 14,000 were ILS approaches!

Sperry's flight research test pilots and engineering crews actually take off whenever and wherever they encounter weather conditions far below airline minimums; however, they continue to conduct repeated approaches and touch-and-go landings! Their CAA waiver of ILS minimums for this purpose is the nearest approach to officially sponsored Zero-Zero landings or all-weather operations that your correspondent has so far witnesed.

During a survey made by Sperry of 99 ILS approaches with ceilings of 100 feet or less (53 by Zero Reader and 46 by the A-12 Approach Coupler) only nine approaches resulted in "go-arounds". Three were due to poorly manually executed turns at the Outer Marker, also attempting a too short turn-on and close approach with a high tailwind component, using the A-12. One was due to coupler malfunction of the equipment and one was due to unsatisfactory performance of the coupler in not maintaining a proper approach path to the point where the pilot could take over visually. Three were due to failure to get visual reference at 100 feet in time to put the airplane on the runway and the last one was due to inability of the pilot to manually keep the airplane lined up *on* the runway after a perfect approach and touchdown in ⅛ mile visibility (virtually no ceiling!)

I was not satisfied too completely with Ed's explanation of the "fail-safe" indications in event of equipment malfunction. The fact that the ILS indicator flag, working on the same signals, is available, did not fit so well in the light of one concentrating on the Zero Reader alone of the approach navigation instruments. Also, whereas such malfunction as a tube or other component could result in full-scale deflection, the possibility of its occurrence at a critical time might result in one first attempting to "zero" it before recognizing the true nature of the indication. It is of sufficient importance to merit further thought on Sperry's part.

Regardless of the above, I came away with a tremendous impression of the value of these two pieces of equipment in terms of the peculiar problems of corporative aircraft crews. Scheduled airline pilots enjoy an undoubted advantage in almost constant route re-familiarization with all instrument approaches at points they regularly fly into. Usually, they can limit their IFR approach probability to a reasonable number of airports at which they soon become both expert and quite at home. This is not so with the corporative pilot who must be prepared to be expert at all airports in the U. S.

Again, if an airline pilot must pass up an airport after a missed approach or because of weather already below minimums, he has the backing of established company policy, regulation and shared responsibility plus the diversity of his passengers' interest in the accomplishment of that particular arrival. The corporative pilot and his passenger usually have a specific and vital economic interest in accomplishing an arrival at what is usually his sole destination. If that airport must be passed up, the entire flight might just as well have never originated. And nobody but the pilot himself can be held to account by his company for failure to complete the flight.

In order to get an unbiased line on the service record and reputation of the Zero Reader with pilots already using same, I did a little research, using the facilities of the CAOA listing of executive aircraft. Throughout some of these corporation aircraft crews operating Sperry's equipment, I found only one complaint that seemed significant. There was some question as to whether adequate corrective provisions were inherent in the Flight Director in conditions of strong drift. Most opinion concurred with my short experience that it was still considerably easier to fly under these extreme conditions than with the ILS unassisted. I put the same question to each, as to whether, given the problem of equipping a new airplane, would they want the Zero Reader and/or the A-12 Gyro Pilot with automatic approach. Without exception, the answer was in the affirmative.

PAN AMERICAN JET CLIPPER—*Preliminary model is shown above of Pan American's version of the de Havilland Comet III jet airliner powered by four Rolls Royce Avon turbojet engines. To be delivered to PAA in 1956, the Comet III will have a payload of 17,500 lbs; fuel capacity of 9700 U.S. gallons; a gross weight of 145,000 lbs. The jet Clipper is expected to cruise at 500 mph; have a range (with full payload) of 2700 statute miles; and an operating altitude up to 45,000 ft. As a First-Class transport, Comet III will carry 58; as a Tourist-Class transport, it will carry 78.*

Navigation **NAVICOM** Communication

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New Off-Airways Instrument Approach System

TVOR systems for commercial applications are now available, according to an announcement recently made by Maryland Electronic Manufacturing Corporation. This marks the first time that any approved electronic airport let-down facility has been offered for less than $10,000.

TVOR is a terminal VHF omni-directional radio range, developed primarily for the smaller airfields. It provides the safety and precision approach facilities of VOR at approximately one-quarter the cost. TVOR circuits require only minimum maintenance. They operate on a 110-volt, 60-cycle a.c. power supply, or can be modified to use any existing power source. The system, already approved by the CAA, can be installed directly on the airport, saves the cost of the additional real estate usually required, and minimizes power and control line costs.

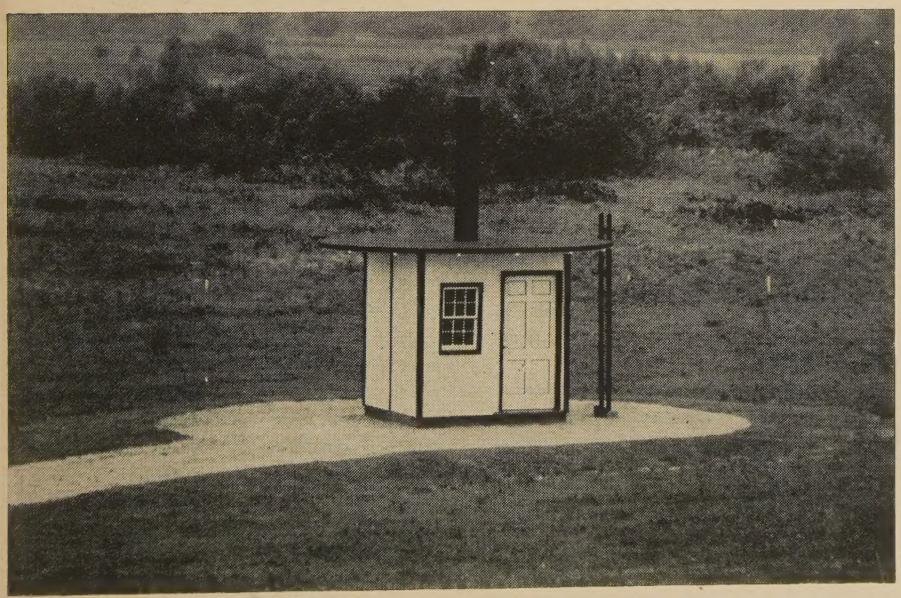
Any aircraft with standard instrumentation can make precision approaches to a field equipped with TVOR. On-course indication is steady; over-the-station-cone is definite. The system can be set to use any three-letter identification code required. Voice transmission for the omni band is standard.

Plans for a simple, inexpensive shelter that can be built by the average carpenter are furnished with each TVOR. The roof serves as the necessary counterpoise, and the antenna can be tuned for operation on any frequency from 108 to 118 megacycles. Initial adjustments are easily made. Once installed, the system operates without attention. Service is extremely simple and maintenance is usually limited to tube replacement. Since they operate at less than normal ratings, long tube life is assured. The system is given the same temperature-humidity tests as those required by the CAA.

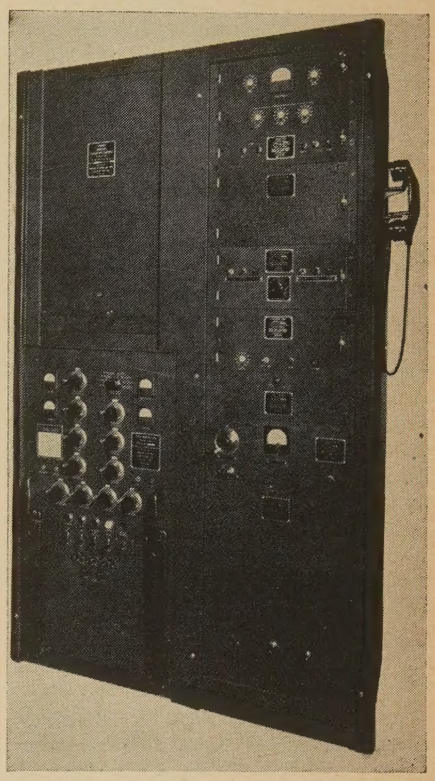
TVOR is a single system radiating 50 watts of power. The main points of difference between TVOR and VOR is that VOR is a dual system and it radiates 200 watts of power.

Especially suitable for corporation, municipal and private airfields, TVOR's cost is low, and with it, it is no longer necessary to wait years for Federal Aid before adding all-weather instrumentation. Municipal fields with TVOR are qualified for all-weather airline service. Corporation fields equipped with TVOR find their planes able to make precision approaches in spite of rain, low ceilings or restrictions of visibility.

The Maryland Electronics Manufacturing Corp. is currently building 18 TVOR transmitters for the CAA.



TVOR SHELTER *can be built by average carpenter from plans furnished by the TVOR system*



TVOR SYSTEM *is single self-contained unit. Normal 110 volt 60 cycle a.c. power is used*

Why Don't They. . . .

▶ Print the minimum IFR altitudes along the airways on Sectional Charts so commonly used by all grades of pilots. Analysis of many flying accidents caused by attempted flight through "stuffed" cloud conditions indicates that pilots share the common doubt as to when to make that famous life-saving 180. Most commonly, the temptation in marginal IFR-VFR weather, considering equipment and pilot limitation, to maintain contact flight has been responsible for the largest portion of such accidents.

▶ Supply adequate service and ramp facilities for corporation aircraft, pilots and passengers at large terminal airports. Only a very few airports provide the proper service for this important and ever-growing segment of aviation. One executive pilot recently reported that an official at Greater Pittsburgh Airport explained lack of service by stating that the airport had not been designed with any thought of servicing other than airline needs!

NARCO Offers Maintenance Hints to Aircraft Radio Equipment Users

National Aeronautical Corporation (NARCO), builders of a large portion of the radio equipment installed in the smaller executive and business aircraft, has issued a service bulletin dealing with the problem of noisy transmitting units. NARCO's solution should be considered by owners of other equipment as well, if reports have been received from communications stations or towers of noisy or heavy background interference.

NARCO advises owners to have service operators check phone and mike jack panels for evidence of vibrator currents flowing in the ground lead of the audio cable to the phone and mike jacks. When the mike button is depressed, the vibrator energy is coupled into the mike circuit, thereby modulating the transmitted carrier signal. If found present, this condition can be eliminated by insulating both jacks from the instrument panel, thereby interrupting the coupling circuit for the flow of vibrator currents from the set through the cable and back to the set through the aircraft structure. Two small insulator washers for each jack will be standard equipment in new installations.

L-R Meter Needle Hunting

Owners of VTR-1 and VTR-1B Omnigators and VHT Omni-Homers who have complained of Left-Right Needle "hunting" should call the following to the attention of their service depots: NARCO advises that, in later issues of the same series equipment, it has been necessary to crimp the center lug on the 2,000 mf capacitor connected across the Left-Right meter. This provides a good low resistance contact between the lug and the wire from inside the capacitor. If crimping the lug does not remedy the needle "hunting," NARCO recommends replacing the capacitor.

Increased Sensitivity, Localizer

Beginning with Ser. #3133 (24 volts) and #4694 (12 volts, circuit changes were incorporated in all production NARCO Omnigators to double the Left-Right needle deflection for any given VAR or Localizer signal.

This results in a "tighter" localizer course, and approximates the course sensitivity of the much larger and heavier airline-type localizer receivers. If found over-sensitive in practice, this may be reduced about 25% by shorting out the 47K ½ watt resistor mounted on the tie lug in front of the oscillator tube socket V103. Owners should consult their radio service depots for particulars or adjustments.

Airways Highlights

ALLENTOWN-READING, Pa.—*These two towers swapped primary VHF's; Allentown now 119.3 mc; Reading now 119.1 mc.*

ATLANTIC CITY, N. J. (Coyle Intersection, Green 5, Amber 9)—*The military have been warning of repeated careless disregard of the Warren Grove Danger Area by aircraft flying these Airways north-south, and off Airways coastal. Bombing and straffing activities have been stepped up in daylight hours.*

BALTIMORE, Md.—*Friendship Tower now on 118.7 mc instead of 119.5 mc; Harbor on 121.3 mc instead of 118.7 mc.*

BATON ROUGE, La.—*The BVOR on 115.6 mc was scheduled to resume operation by first week of December.*

CANTON-AKRON, Ohio—*Tower primary VHF frequency now 118.3 mc.*

BUFFALO-ELMIRA, N. Y.—*These two towers swapped primary VHF frequencies. Buffalo now 121.1 mc; Elmira on 119.1 mc.*

CLEVELAND, Ohio—*Newly installed snow lights on runways and taxiways are as much as 30 inches high. Dangerous to DC-3, Twin-Beech and inboard props of DC-4!*

DALLAS, Tex.—*ILS Localizer recommissioned on old frequency 110.3 mc. Glide Path to follow; new interception altitude 1,640 ft. msl over Outer Marker now 4.81 miles from runway, and 730 ft. msl over Middle Marker now .72 miles.*

GREAT FALLS, Mont.—*New ILS commissioned, 110.3 mc; serving Runway 34, ident: "GTF". LOM on 382 kc at 4.47 miles, LMM on 362 kc at .66 miles.*

GRAND RAPIDS-LANSING, Mich.—*These two towers swapped primary VHF frequencies. Grand Rapids now 119.3 mc; Lansing now 119.9 mc.*

GRUMMAN, N.Y.—*Tower VHF on 119.3 mc decommissioned. New frequency 121.3 mc same as Islip.*

HARTFORD, Conn.—*Primary VHF tower frequency now 119.3 mc, eliminating interference from high-altitude aircraft on 119.9 working LaGuardia Approach Control.*

LUBBOCK, Tex.—*New ILS commissioned on 109.5 mc, serving Runway 17, ident: "LBB". LOM on 219 kc at 4.76 miles, and LMM on 201 kc at .73 miles.*

MILWAUKEE, Wis.—*Tower and range station report heavy local interference makes 3105 kc transmissions almost unreadable; suggest pilots use appropriate VHF frequencies.*

NEW YORK INT'L—*Long Beach, Scotland and Sully Intersections re-defined. Idlewild LF range course intersections replaced by ADF bearings of same magnetic relationship to IDL range used as Homing Beacon only (and by intersection of IDL Localizer course), with Mitchel, Newark and Islip ranges respectively.*

OAKLAND, Cal.—*Tower low frequency 266 kc discontinued, ATC transmissions on Middle Marker Comlo 341 kc instead.*

OKLAHOMA CITY, Okla.—*New Hi-intensity approach lights installed on approach lane to ILS runway (109.9 mc).*

OTTAWA, Ontario—*LF range now receives on 121.5 mc, 122.1 mc and 126.7 mc.*

PHILADELPHIA, Pa.—*ILS resumed operation on 108.3 mc following installation of rear screen, improving Localizer signals.*

PITTSBURGH, Pa.—*Transfer of facilities between Alleghany County and Greater Pittsburgh virtually completed with following changes: Greater Pittsburgh ILS now using the identification "PIT" on 110.3 mc; Alleghany County ILS now keying "AGC" on 109.5 mc. Also, Greater Pittsburgh LOM identification on 201 kc changed to "PI" instead of "GR." Alleghany County primary VHF changed from 119.7 119.3 mc. Look for 119.7 at "PIT."*

ISLIP, N. Y.—*Tower VHF frequency now 121.3 mc.*

TOLEDO, Ohio—*Tower primary VHF frequency now 119.3 mc.*

WESTCHESTER, N. Y.—*Tower has unique facility of being able to transmit on 278 kc, most commonly known Tower low frequency, in event unable to establish contact with an aircraft on assigned frequency 260 kc. ILS should resume full operation on 109.7 mc; runway lengthening completed.*

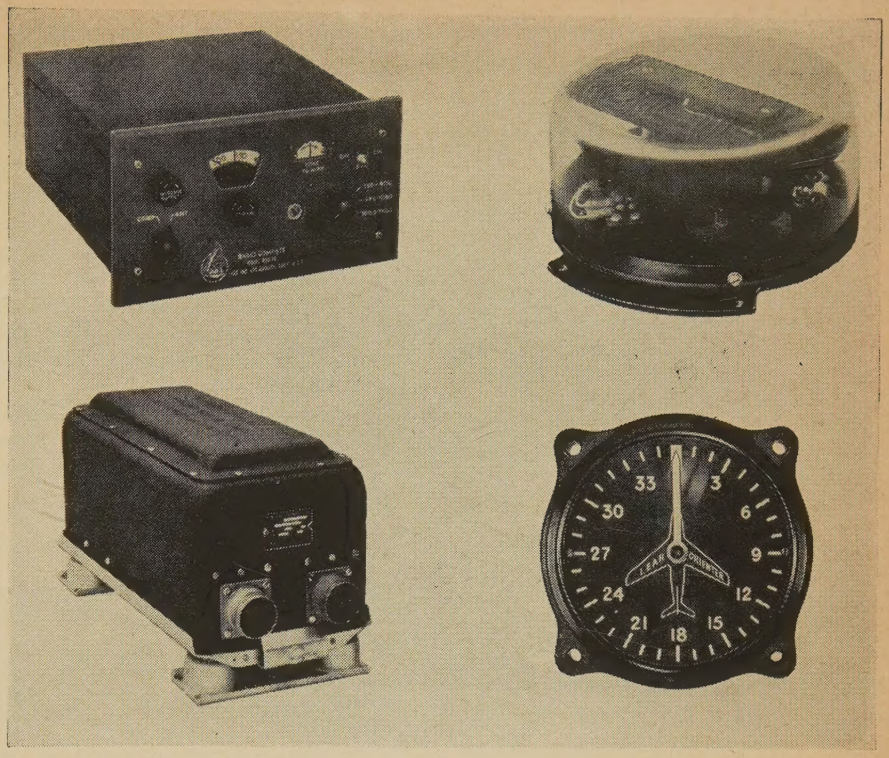
YOUNGSTOWN, Ohio—*Tower primary VHF changed: 120.7 mc.*

Lear Offers New ADF-14 For Corporate Aircraft

A new heavy duty radio compass, appropriately named the "Executive," is now in production and being offered for civilian use by the LearCal Division of Lear Incorporated, Los Angeles, Calif. This new unit, Model ADF-14, is a completely redesigned version of the popular ADF-12 Lear Orienter.

The unit consists of four basic components: tuner, shock-mounted amplifier, an azimuth indicator, and an hermetically sealed loop which is considerably smaller than previous types and offers the added advantage of permitting flush mounting and eliminating the need for an external blister housing. Transformers and metal-clad capacitors are hermetically sealed; all components have been moisture- and fungus-proofed wherever required. The amplifier and tuner are finished in Lear platinum grey wrinkle that resists corrosion and scratching. Both a tuning meter and a beat frequency oscillator are provided. Frequency coverage is in three bands: 195 to 400 kc; 475 to 1050 kc; and 1,000 to 1750 kc.

The ADF-14 features a high-fidelity radio receiver which will work through a speaker or headphones. Audiopower output is 3 watts maximum, 1½ watts undistorted.



EXECUTIVE ADF-14 *installation includes tuner with three-band frequency coverage: 195-400 kc, 475-1050 kc, 1000-1750 kc. Loop permits flush mounting; is moisture-sealed, fungus-proofed*

To File—or Not to File?

A couple of years ago, much effort was applied to a campaign to encourage pilots of private and corporative aircraft on VFR cross-country to file flight plans. Outstanding was the emphasis on the advantages in event of any untoward circumstance cutting the flight short at a time or point not of the pilot's choosing and resulting in possibly a crippling accident.

Tending somewhat to throw cold water on the pilot's eagerness to employ this safety facility was the equal emphasis on the dire and dread things that would ensue if a careless and forgetful pilot failed to close or amend such a flight plan as necessary. The fact that a pilot who makes it a practice to always file a plan will very shortly make the closing and proper execution of flight-plan details a habitual part of his flight termination procedure was not sufficiently emphasized.

Many pilots found the lengthy detail of the required plan form discouragingly irksome, especially the inevitable repetitious detail of personal and aircraft autobiography. Both in terms of personal and radio time consumption, these items became annoying doggerel.

A couple of years ago, somebody in an airways radio station with a commendable eye to improving the public service, proposed that all pilots (and aircraft habitually flown cross-country) place on record at their home base airways station, this basic and repetitious information and thereafter make only a short reference to this fact whenever and wherever filing a plan.

Although never sufficiently publicized, this system was greeted with acclaim by grateful pilots everywhere and much radio and personal time was saved with an additional incentive to filing.

Secondly, through the years, busy stations and towers everywhere began to find it more effective and result producing to keep each other advised of VFR flight plan movements, in and out, without relying entirely on the pilot's initiative to request this service. Consistently supplying each other with the basic identification and time planned or actual was less trouble and time consuming than subsequent belated inquiry in a clear majority of times when pilots failed to request this service.

However, it was a fact that the regulations clearly stated that the closing of a plan, in person or by specific request of the pilot, was the pilot's responsibility. Similarly, there was no provision in the regulations for the additional service to the public represented by the one-time-record of the file system.

In the last year, tower and radio station personnel have been apologetically explaining to pilots that the word has been passed from above to cease these unauthorized services. Of course, in some isolated instances, it had never been adopted. In fact, one young female in a backwoods spot with nothing to do but study the regulations, stated that "the pilot (that means you, fellow taxpayer!) needs to be educated to his responsibilities and not be pampered by extra services not covered in the regulations!"

So, as the book reads, the responsibility is the pilot's to open and close his plan, and to repeat endlessly his autobiography in so doing, whether or not the operation is conducted to or from a control airport. It should be clear that this is not a personal preference of a majority of the facility personnel or even their immediate superiors but an adherence to a regulation that only the flying public can see changed by sufficient interest in the problem.

United Air Lines Adopts VOR as Primary Nav-Aid

Installation of VOR equipment on all United Air Lines DC-6's and 28 DC-3's has been completed and the company will adopt VOR as its primary navigation aid shortly.

United pilots are rounding out a three-months orientation program in the use of the new equipment, and VOR operations on about 98% of United's 13,250-mile system already has been authorized by the CAA. United began VOR operations between Boise, Idaho, and Reno, Nevada, in September, 1949. This is believed to have been the first regular use of VOR as a primary aid.

NATCC Issues Operating Specs for Newark Airport

Newark Airport's new instrument runway (4/22) has been commissioned and is in use. Runway 6/24 has been permanently abandoned, and Runways 10/28 and 4/22 now are the only runways in use at Newark.

1. The preferential runway system is in force and is operated according to the following specifications:
   a. Permissible crosswind velocity shall not exceed 15 mph at 80° on either side of runway heading.
   b. Permissible crosswind velocity not to exceed 6 mph will be effective to the full 90° on either side of the runway heading.

The preferential runway sequence for aircraft landing or taking off at Newark is:

Landing: 22 — 28 — 4 — 10
Take-off: 10 — 4 — 22 — 28

In the application of the Preferential Runway Use Program, all of the following conditions must be satisfied:

Ceiling—1,000 ft. or above. (A scattered cloud condition observed or reported below 1,000 ft. and within the approach or departure flight paths and which may materially affect a particular type of operation, such a cloud condition may be considered to constitute a ceiling. Controllers are cautioned to exercise good judgment in this respect in that consideration shall be given to density and arrangement of such formations.)

Visibility—3 miles or better.

Wind Velocity—15 mph or less to 80°.

In determining the preferential runway to be used for landings and/or take-offs, controllers shall refer to the Preferential Runway Index and, in addition, consideration shall be given to the following factors:

   a. Pilot request.
   b. Wind direction and velocity.
   c. Braking efficiency and runway condition.
   d. Potential hazard on or near runways or taxiways.
   e. Conflicting flight paths.
   f. Reduced visibility (less than 3 mi.) in approach or departure flight paths.

When wind velocity is less than 6 mph, controllers may select a runway or combination of runways in accordance with the Preferential Runway Index provided such selection will not result in a downwind component. Controllers are cautioned against employing both ends of a single runway for purpose of conducting alternate operations whether landings or take-offs or both.

2. Take-offs on all runways shall be made straight out until an altitude of 1200 ft. is reached, whereupon aircraft may proceed on course. Turns after take-off as authorized by the Tower are permissible only after 1200 ft. has been reached, except in cases of emergency.

3. Traffic patterns are in accordance with standard rectangular left-hand traffic unless otherwise cleared by ATC.

4. Aircraft entering traffic pattern shall not descend below 1200 ft. until turning onto base leg. On straight-in approach, aircraft will not descend below 1200 ft. until within 5 miles of runway. Generally, minimum altitude of 1200 ft. shall be maintained until pilot can start normal descent and avoid "drag-in" type approach.

5. There shall be no training flights from Newark Airport except those qualification flights that must be conducted at this airport.

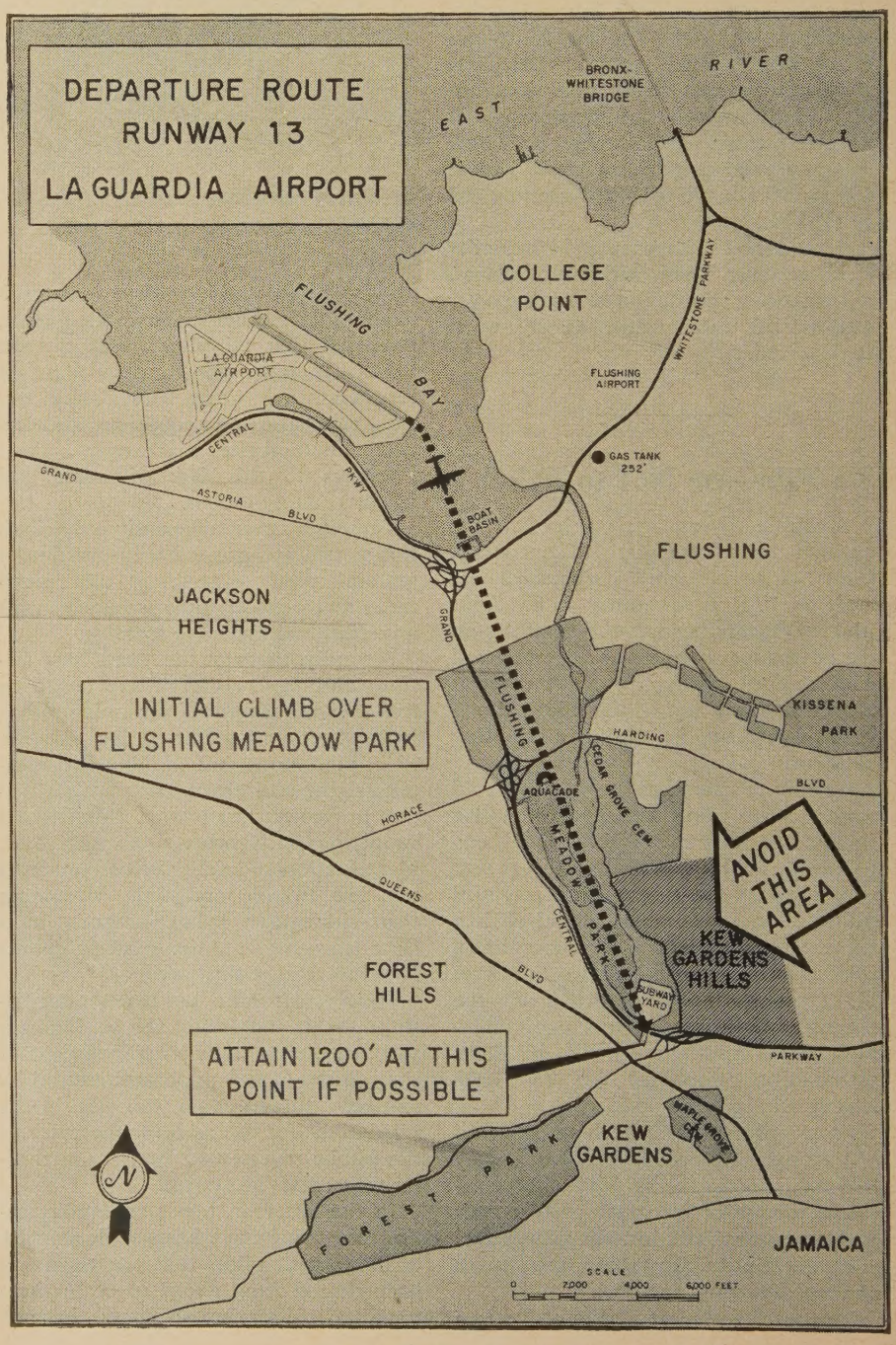
6. Engine run-ups, excepting for preflight run-ups, shall be conducted in areas specifically designated by the Port Authority.

During instrument weather, normal CAA IFR's prevail.

Adherence to these procedures is imperative, and the National Air Transport Coordinating Committee asks your full cooperation.

Runway 13 Take-offs at LG

Present procedure governing take-offs on Runway 13 at LaGuardia includes a requirement that, under certain conditions, a right turn be made after take-off, and climb be accomplished over Flushing Meadow Park to its SE end before proceeding on course. Note the map below.



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